

FLIGHT

The
**AIRCRAFT
ENGINEER
&
AIRSHIPS**

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 937. (No. 49, Vol. XVIII.)

DECEMBER 9, 1926

Weekly, Price 6d.
Post free, 7d.

Flight

The Aircraft Engineer and Airships

Editorial Offices: 36, GREAT QUEEN STREET, KINGSWAY, W.C.2.

Telegrams: Truditur, Westcent, London. Telephone: Gerrard 1828.

Annual Subscription Rates, Post Free.

United Kingdom .. 30s. 4d. Abroad 33s. 0d.*

These rates are subject to any alteration found necessary under abnormal conditions and to increases in postage rates.

* Foreign subscriptions must be remitted in British currency.

CONTENTS

	PAGE
Editorial Comment	
The Paris Aero Show	799
Paris Aero Show: General Views	801
Paris Aero Show	802
British Engines, Accessories, etc.	810a
Personals	813
Light 'Plane Club Doings	814
"From the Four Winds"	815
Air Ministry Notice to Airmen	816
In Parliament	817
Imperial Defence	818
Royal Air Force	819
R.A.F. Intelligence	819
Society of Model Aeronautical Engineers	820

EDITORIAL COMMENT.



The
Paris
Aero Show

THE general impression left upon one's mind after a tour of the Grand Palais in the Champs Elysees, where the tenth International Aero Exhibition is at present being held, is that if there is little that is startlingly new, or strikingly original, the general quality of the exhibits, as far as aircraft are concerned, is considerably above that of previous Paris Aero Shows. Where hitherto the machines that gave one the impression of being purely experimental formed quite a large percentage, this year there are very few machines which have not been flown, and only one or two about which there can be any doubt as to whether they ever will fly. That in itself is something to the good. The fact that nearly all the weird designs which adorned (?) the earlier exhibitions have disappeared is a healthy sign that the French aircraft industry is beginning to settle down to really serious work. We say French, because, in spite of the presence of a few foreign exhibitors of aircraft, the *Salon* is in the main of a very French character.

Great Britain cannot be said to be adequately represented by one machine, no matter how good that machine may be, and the fact that owing to transport trouble this machine was late in making its appearance on its stand, early visitors to the Grand Palais had no opportunity of knowing there was a representative of British aviation in the show. When the transport fiends had done their worst, those responsible for the show arrangements worked like Trojans, and lost no time in getting the machine and stand into shape.

Considering the very great effort which France is making in the matter of commercial air lines, it cannot be said that the proportion of commercial to military types is large, nor that the commercial machines shown represent, except in one or two cases, any real advance compared with those shown at previous *Salons*. Apparently, much still remains

"FLIGHT" PHOTOGRAPHS.

To those desirous of obtaining copies of "Flight" Photographs, these can be supplied, enlarged or otherwise, upon application to Photo. Department, 36, Great Queen Street, W.C.2

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

1926

- Dec. 3-19 Paris Aero Show
Dec. 9 Captain F. Entwistle, B.Sc. "Wind Structure in Relation to Air Navigation," before Inst.Ae.E.
Dec. 16 Wing-Comdr. C. D. Breeze, A.F.C., R.A.F. "The Training of Aircraft Apprentices," before R.Ae.S.

to be done before the comfort of the passengers can equal that of a railway carriage, before absolute reliability can be expected, and before that safety, which should be the first aim in all civil aircraft design, is attained. Thus, it is significant that but a single French three-engined aircraft is exhibited—the Marcel Besson flying-boat with three Gnome-Rhone "Jupiter" engines. This machine shows an appreciation of the value of the three-engined type, but otherwise the machine itself does not impress one particularly. The wing structure, and especially the spars, look as if the structure had originally been planned in metal, but that for some reason it became necessary to change it to wood at the last moment. Whether this was actually the case we have been unable to ascertain, as those in charge of the stand appeared reluctant in vouchsafing any information whatever. It is even reported that in one case an artist making sketches (*not* a FLIGHT artist be it noted, as we were permitted to obtain a general view) was set upon and his sketches torn up. The obvious retort to this incident—which did little more than contribute for a moment to the gaiety of nations—is, of course, that one cannot seriously blame those in charge of the stand for not wishing to have their detail work published.

In the matter of seaplanes generally, the impression is easily formed that nothing at the show indicates that Great Britain need yet fear serious competition in this class of machine. Some improvement is certainly to be noted in the design and construction of flying-boat hulls, but there is still too much tendency to retain the flat-sided rigid hull and the single step. This is all the more remarkable when it is known that the second step can nowadays quite easily be made to prevent all tendency to porpoising.

As regards the land machines, one notices a tendency towards the disappearance of the *sesquiplan* in favour of the parasol monoplane, a type originated before the war by the Morane-Saulnier firm, and which has been adopted in quite a considerable number of machines, even large ones, at the show. Thus in the Nieuport-Delage machines, the type 42 (a *sesquiplan*) is shown next to its modern development the 48, which is a parasol monoplane. The Avimeta machine, an all-metal two-seater of fairly large span, is a parasol monoplane, as is also the large three-engined Besson flying-boat.

The thick-section wing does not appear to be making a great deal of headway, although one or two examples are exhibited in which the wing roots are of fairly thick section. On the other hand, the section of medium thickness seems to be making considerable headway.

While on the subject of wings, an English visitor cannot fail to be struck by the apparent disregard for "down-loads," which most French designers affect. In many cases the answer may be that the particular machine is not intended to be able to fly upside down, nor to be dived steeply. Doubtless that is perfectly true, but any aeroplane, when flying in fog or clouds, is apt to be placed, without the pilot momentarily

being aware of the fact, in all sorts of unintentional attitudes, and it would seem prudent to guard against such contingencies.

On the subject of engines, it can, we think, be said that these are of uniformly high quality. That the radial air-cooled type is making great headway is very obvious. Thus the "Jupiter" alone is fitted on something like 50 per cent. of the machines exhibited, while the radial air-cooled type generally is found on an even larger percentage. The manner in which the radial air-cooled engine is coming to the fore is, perhaps, nowhere better illustrated than in the case of the Lorraine-Dietrich firm, on whose stand are shown two radials bearing a very strong resemblance to the Armstrong-Siddeley engines, suggesting that they could only have been evolved through the amicable co-operation of the two firms, by which the French house has had the benefit of the Armstrong-Siddeley experience. The Armstrong-Siddeley engines themselves are attracting a good deal of attention, and the extremely useful series of four engines, in which three types have the same cylinders and pistons, &c., is favourably commented upon.

In the water-cooled class, the Vee type seems still to predominate, although the W, or "broad arrow" formation is also to be found in large numbers. The increase in the number of engine types of more than 500 h.p. is another notable feature of the *Salon*, and engines of 700 and 800 h.p., or even more, are no rare sight this year. The sleeve-valve engine is another type that appears to be coming along, and it is, perhaps, significant that in the great million-francs engine competition a sleeve-valve engine, the Panhard-Levassor, secured second place, while showing the lowest petrol consumption of any in the competition. Thus this type of engine may be assumed to have proved itself, and its further development will be watched with interest.

Of really novel types there are, as far as we have been able to discover, but two on view. One of these is the water-cooled horizontally opposed "Caffort," which is stated to develop 500 h.p. It is as yet purely an experimental engine, but we are informed that it has in all run for 13 hours, so that at any rate "it works." This engine is mainly intended, we gather, for use on thick-wing machines, in which it can be buried inside the wing without adding anything to the head resistance of the machine. Another advantage of the flat type would seem to be that in certain types of machine a much better view might be provided. The type seems worth developing, and might be given consideration on our side of the Channel also.

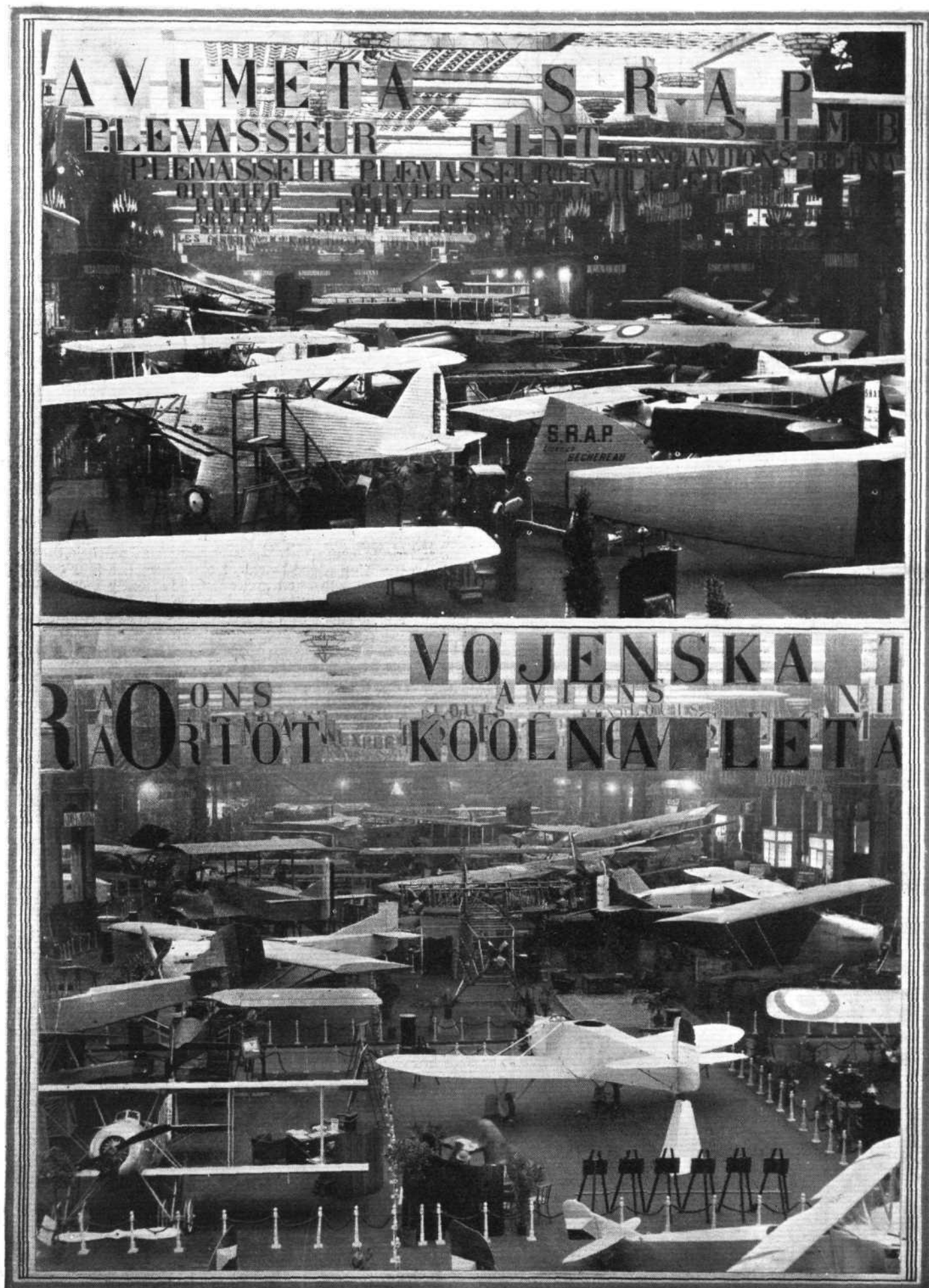
The only other new type is the Italian "Cappa" engine, which is stated to develop 450 h.p. It looks like a box of trapezoidal cross section, with the propeller hub at one end and what appears to be some form or fan or blower at the other. Whether it is a forced induction type of two-stroke we have been unable to discover. Nothing could be gathered on the stand, but the required information was "incessantly expected."

Errata

In the unavoidable "rush" that attends the preparation of such features as last week's special British Aircraft Section errors are bound to pass undetected. For instance, last week, in referring to the Vickers machines, the speed of 115 m.p.h. quoted for the "Vespa" should have been indicated as being

"at 6,000 metres," and the speed of 126½ m.p.h. for the "Vixen" Landplane, heavy, "at 3,000 metres."

Again, on p. 786w of the same issue (Westland Aircraft Works), in referring to Capt. Hill's flights on the "tailless aeroplane," we stated that he "flew the machine in attitudes, etc.," This, of course, should have read "in attitudes"



["FLIGHT" Photographs

THE PARIS AERO SALON: General views in the Grand Palais. Top, as seen from the North; below, viewed from the South.



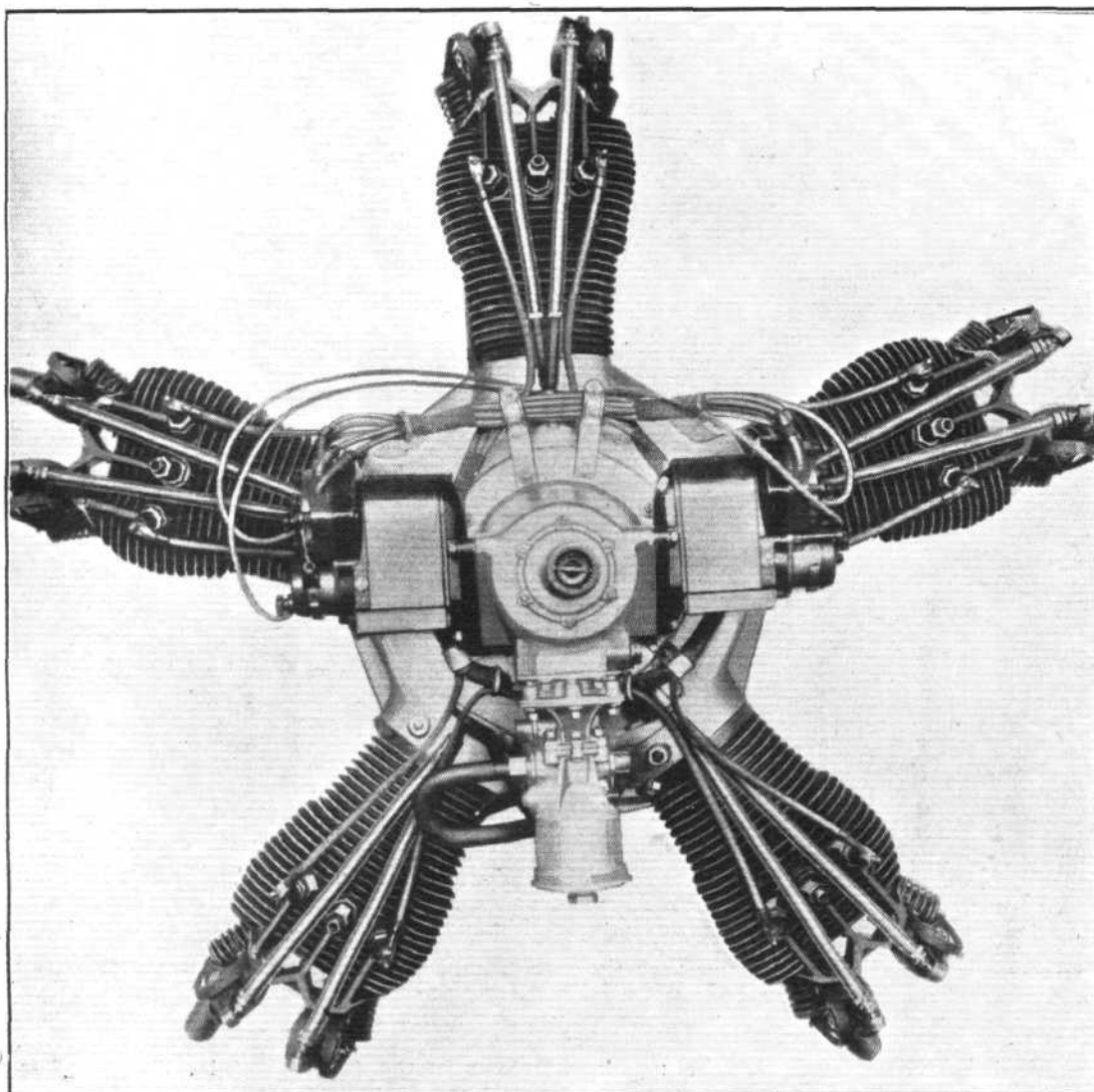
AERO ENGINES AT THE SALON

IN our issue last week, we published illustrations and data relating to most of the aircraft exhibited at Paris, and with one or two exceptions all the machines stated in our advance report to be intended for the show have actually turned up. This week we continue with brief specifications of some of the more important aero engines to be seen at this year's *Salon*.

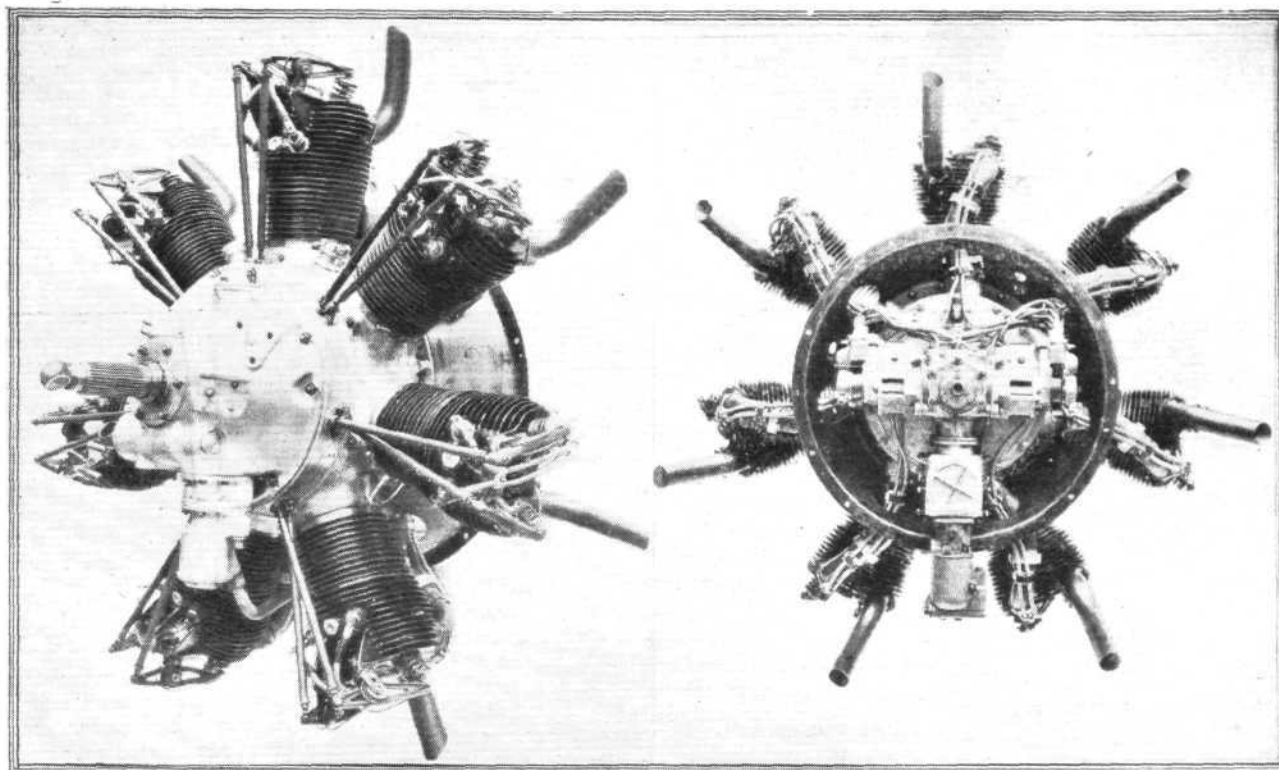
ARMSTRONG SIDDELEY MOTORS, LTD.

THE exhibits of this British firm include a complete range of engines from the little "Genet" to the famous "Jaguar" used by Sir Alan Cobham on his flights to Cape Town and back, and to Australia and back. The stand, although under

the gallery to some extent, is fairly prominently situated, and is attracting a good deal of attention, the four engines being beautifully finished and extremely neatly mounted on wooden bases supporting aluminium columns on which the engines rest. Three of the Armstrong-Siddeley engines are



British Engines
 at the Paris Show:
 The Armstrong-
 Siddeley "Mon-
 goose," of 120 h.p.

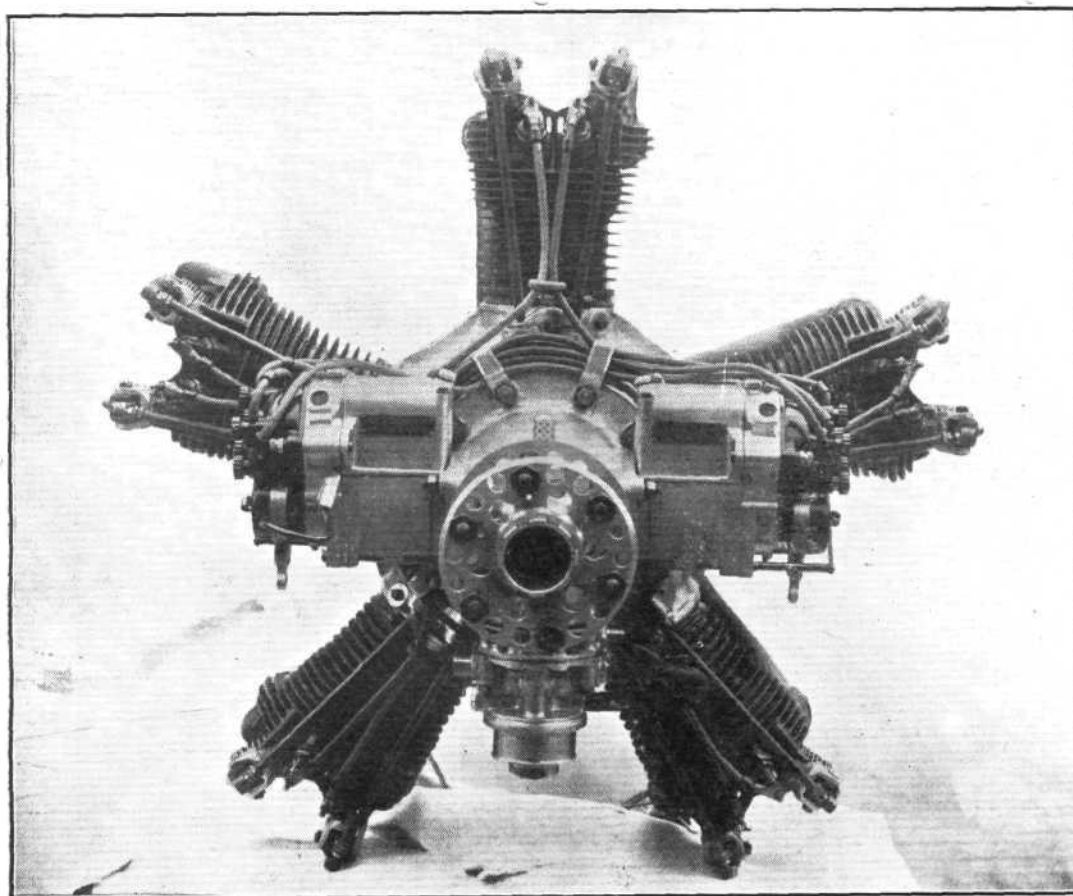


BRITISH ENGINES AT THE PARIS SHOW : Two views of the Armstrong-Siddeley Lynx, that on the right showing the crankcase cover removed.

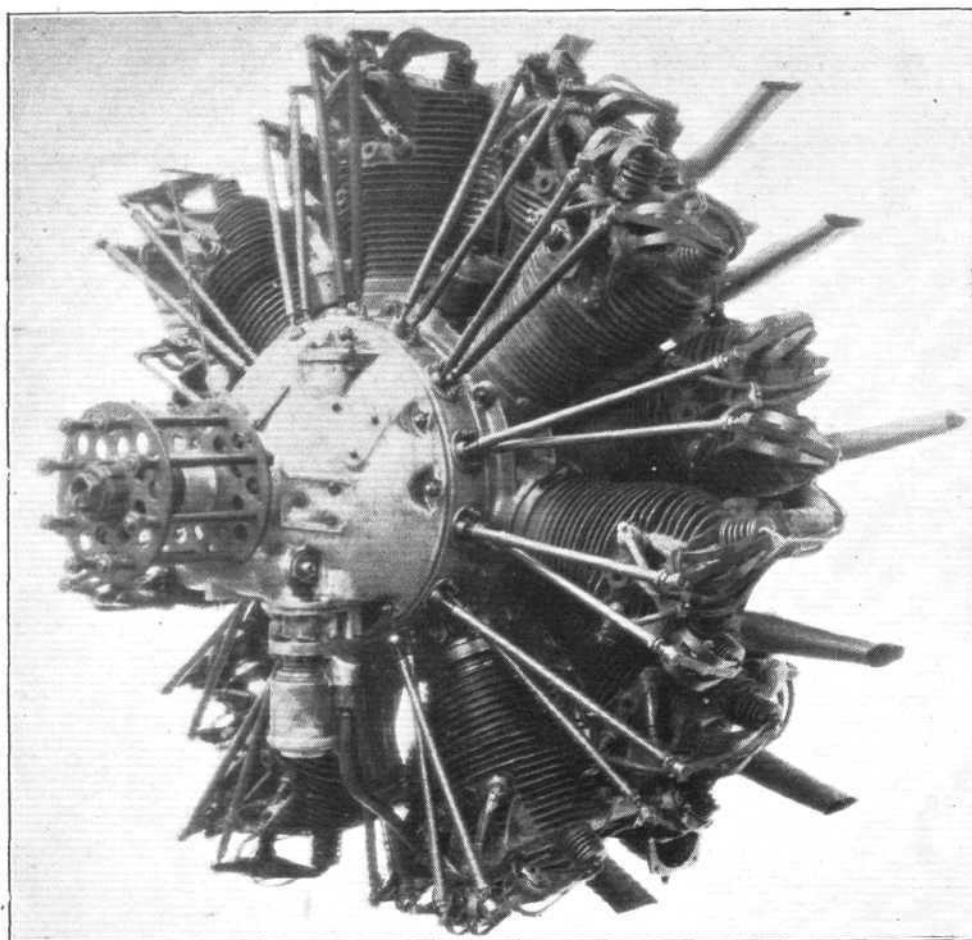
already well known to readers of *FLIGHT*, and will not, therefore require, a very detailed reference here, but the fourth, the "Mongoose," is an entirely new type which has not been shown in public before, and we therefore propose to deal with this engine at rather more length. In order, however, to make our account complete, we give below the specifications of the three older types of Armstrong-Siddeley engines.

The "Jaguar" is a 14-cylinder radial air cooled engine

with its cylinders arranged in two rows of 7 each, the rows being staggered so that the cylinders of the back row are in line with the openings between those of the front row. The "Jaguar" has a bore and stroke of 125 mm. and 140 mm. respectively, giving a total capacity of 24.781 litres. The compression ratio is 5 to 1 and the power of the engine is 400 h.p. to 425 h.p. The normal speed is 1,700 r.p.m. The petrol consumption is 0.56 pint per h.p. per hour, and the



British Engines at
 the Paris Show :
 The Armstrong-
 Siddeley 65-75
 h.p. "Genet."



BRITISH ENGINES AT THE PARIS AERO SHOW: The 400 h.p. "Jaguar."

oil consumption 0.025 pint per h.p. per hour. The weight of the engine dry is 348 kg.

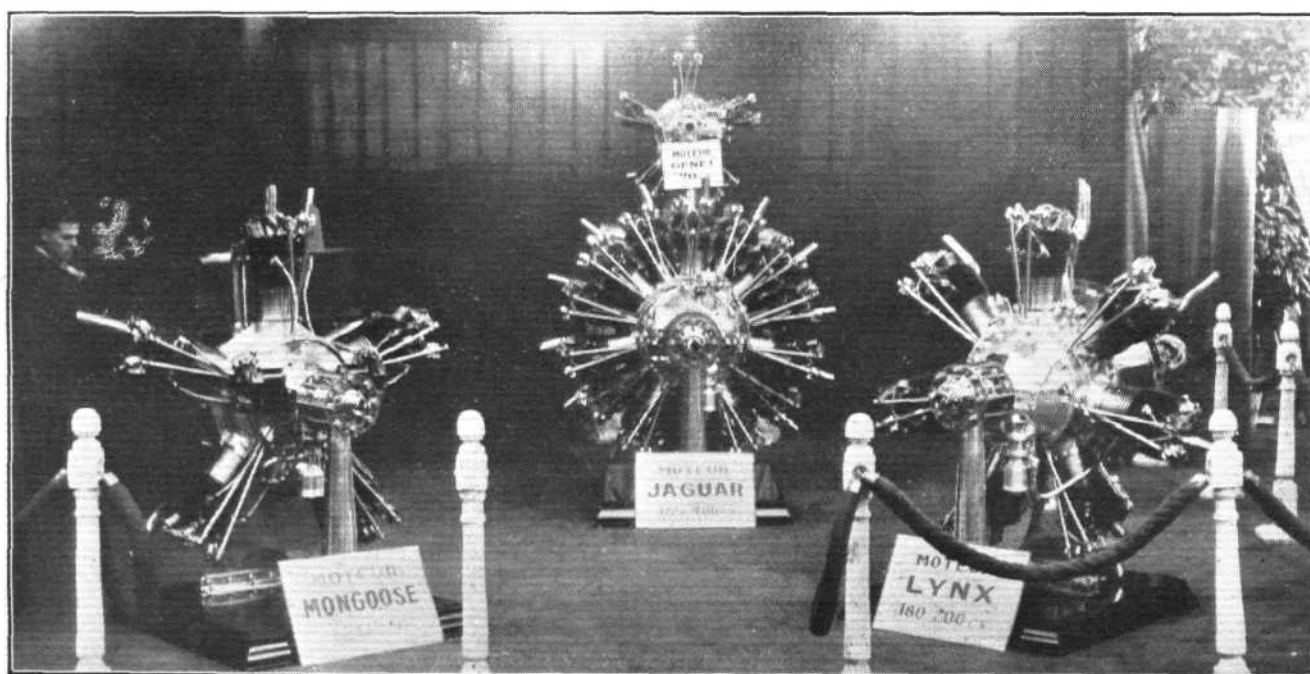
The "Lynx" may be said to be one-half of the "Jaguar" in that it has the same cylinders and pistons, but only one row of 7 cylinders as against the 14 cylinders of the more powerful model. The power is 180 to 210 h.p., and the normal speed 1,620 r.p.m. The bore, stroke and compression ratio are the same as those of the "Jaguar," as are also the petrol

and oil consumptions. The cubic capacity is 12.395 litres. The weight of the engine is 174 kg.

The "Genet" is a radial air-cooled five-cylinder engine, designed for light aeroplanes such as those used by the British Light Aeroplane Clubs, and by a number of private owner-pilots. In general design it follows the lines of the two more powerful types, the following being its main characteristics: Bore, 100 mm.; stroke, 100 mm.; capacity, 3.92 litres; compression ratio, 5.2 to 1; power, 65/75 h.p.; normal speed, 1,850 r.p.m. The petrol consumption is 0.575 pint per horse power per hour, and the oil consumption 0.03 pint per horse power per hour. The weight is 76 kg.

The "Mongoose" is a medium-powered air-cooled five-cylinder engine of the same general type as the other Armstrong-Siddeley models. The crankcase is of aluminium and carries on its front cover the breather, oil pumps, and two Watford magnetos, which are cross driven from the crankshaft, and thus placed most accessibly. The rear cover of the crankcase incorporates the cover for the induction fan, with which, like the "Jaguar" and "Lynx," the "Mongoose" is equipped. To this cover is fitted the oil-heated induction elbow to which is attached the Zenith carburettor. Inside the induction cover is the mixing fan, the mixture then reaching the cylinders through five induction pipes. The design of the cylinders and heads incorporates the well-known patented Armstrong-Siddeley practice, the alloy heads being screwed, shrunk and locked into the steel forged cylinders, which in their turn are screwed into liners in the case and then locked up by clamping rings. The cylinder heads accommodate overhead valves which are returned to their shrunk-in aluminium-bronze seats by duplex springs. The sparking plugs are screwed into phosphor-bronze bushes, which are also screwed and shrunk into the cylinder heads.

The valve driving mechanism incorporates a six to one



BRITISH ENGINES AT THE PARIS SHOW: The Armstrong-Siddeley Stand, with four engines displayed.

epicyclic gear reduction between the crankshaft and the cam drum, the latter revolving in the same direction as the crank. The cams operate roller-ended tappets which drive tubular push rods carrying the necessary means for adjustment at their upper ends. The single-throw crankshaft runs on three roller bearings, two being located one on each side of the webs, and one at the front end where a ball-thrust race is also provided.

Lubrication is on the dry sump principle. The suction pump, which is located on the front cover and driven by bevels off the crankshaft, draws filtered oil from the small chamber at the base of the case, and forces it to the induction elbow on the rear cover, and thence back to the oil tank. The pressure pump, which is also located on the front cover and driven by bevels from the crankshaft, forces the oil from the tank through a second filter, and up through the centre of the pump-driving shaft to the crankshaft. Thence the oil passes to the crankpin, splash being relied upon to feed the pistons and small ends, and the timing gear being supplied from the overflow.

The master connecting rod and four auxiliary rods are formed from steel forgings, and the pistons are forgings of "Y" alloy. Fully floating gudgeon pins are secured by circlips in the piston bosses. The pistons are fitted with two pressure rings and one oil-retaining ring.

Following are the main characteristics of the Armstrong-Siddeley "Mongoose" engine: No. of cylinders, 5; cooling, air; bore, 127 mm.; stroke, 140 mm.; capacity, 8.85 litres; compression ratio, 5 to 1; power 125 h.p.; normal speed, 1,620 r.p.m.; petrol consumption at normal power, 7 galls. per hour; oil consumption at normal power 2.5 pints per hour; weight, 153.8 kg.

THE BRISTOL ENGINES

THE range of engines exhibited by the Bristol Aeroplane Co., Ltd., includes the famous "Jupiter" (which is found on something like 50 per cent. of the machines exhibited), the "Lucifer" and the "Cherub." These engines have all been described and illustrated in *FLIGHT* from time to time, and so will be familiar to our readers, while all three have "made good" in their respective spheres, so that their work will be equally familiar. At Paris the Bristol stand is rather out of the way in that it is situated in a corner and under the gallery, but the reputation of the engines is such that there is never any lack of visitors to the stand, and genial Mr. Fernie is kept busy supplying engine booklets giving full particulars, not to mention the very beautiful series of Bristol postcards which one may obtain on this stand.

The fact that the Bristol engines are already so well known makes detailed descriptions unnecessary. Each of the three

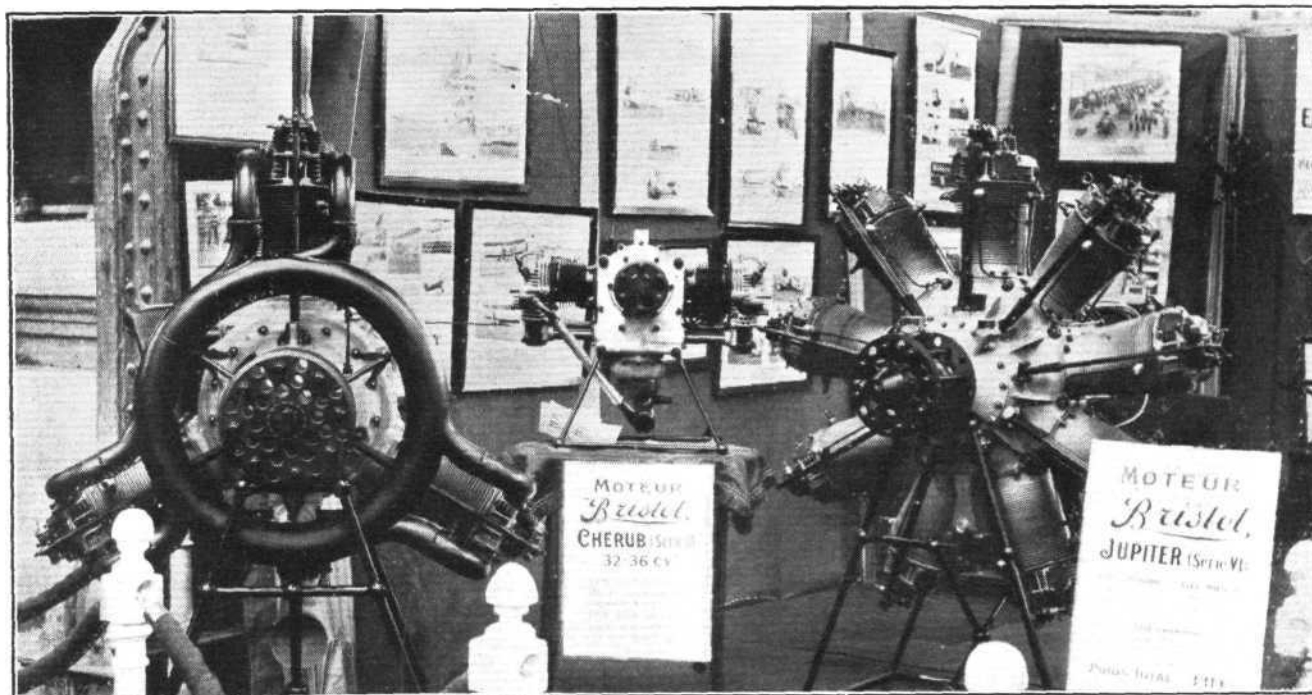
types has proved itself to be up to the high standard which the Bristol firm has maintained since the earliest days of flying, and perhaps it would be difficult to find a better proof of the esteem in which Bristol engines are held than that provided by the manner in which they have been taken up abroad. Take the "Jupiter," for instance. This engine, which is of a power and class for which there is a great variety of uses, is now being manufactured under licence in France, Czechoslovakia, Italy and Japan, with the result that the "Jupiter" engine is now to be found in service in a very large number of countries, such as France, Germany, Norway, Finland, Sweden, Czechoslovakia, Japan, Holland, and Italy, to mention but a few. To take but one of these countries, France, we believe that since the Gnome and Rhône Company obtained licence to build "Jupiters" in France, the French Government has placed orders for something like 800 engines. These, as is well known, have been used in an extraordinary variety of types of aircraft. In commercial aircraft, also, the "Jupiter" is employed to a very large extent, its low specific weight enabling machines in which it is fitted to carry a proportionately greater useful or paying load.

The smaller Bristol engine, the "Lucifer," has been used very extensively, not only at the Bristol flying school at Filton, but also abroad for school and other purposes. At the Bristol school, which has been in operation for about three and a half years, over 600 pupils have taken courses, and there has never been a single forced landing due to engine trouble.

The "Cherub," the smallest of the Bristol "family," also has a very distinguished record, one of its most recent successes being, of course, the winning of the first prize offered by the *Daily Mail* for two-seater light aeroplanes at Lympne, this competition having been won by a Hawker "Cygnets" with Bristol "Cherub" engine. Abroad, also, the "Cherub" has worthily upheld British prestige, and in this connection it will suffice if we recall the recent flight by the German pilot von Conta across the Alps from Munich to Rome in a Messerschmitt monoplane, fitted with the Bristol "Cherub."

Following are the main characteristics of the Bristol "Jupiter" series VI exhibited at Paris: Nine-cylinder, radial air-cooled; bore, 146 mm.; stroke, 190 mm.; total cylinder capacity, 28.7 litres; normal speed, 1,700 r.p.m.; maximum speed, 1,870 r.p.m.; compression ratio, 6.3 to 1; power at 1,625 metres: 425 h.p. at 1,700 r.p.m., 465 h.p. at 1,870 r.p.m.; petrol consumption at maximum power, 132 litres per hour; oil, 5.6 litres per hour; petrol consumption at normal power, 109 litres per hour; oil, 4.5 litres per hour; weight, 331 kgs.

The three-cylinder radial air-cooled "Lucifer" has the following characteristics: Bore, 146 mm.; stroke, 159 mm.;



"FLIGHT" Photograph

BRITISH ENGINES AT THE PARIS SHOW: The three Bristol representatives shown above are from left to right, the 120 h.p. "Lucifer" series IV, the 32-36 h.p. "Cherub" series III, and the 425 h.p. "Jupiter" series VI.

total swept volume, 8 litres; compression ratio, 5.3 to 1; normal speed, 1,700 r.p.m.; maximum, 1,870 r.p.m.; normal power, 130 b.h.p.; maximum, 140 b.h.p.; petrol consumption at maximum power, 36 litres; oil, 2.2 litres per hour; petrol consumption at normal power, 27 litres per hour; oil, 1.2 litres; weight of engine, 150 kgs.

The main data relating to the "Cherub" series III are: Type, two-cylinder opposed air-cooled; bore, 90 mm.; stroke, 96 mm.; cubic capacity, 1.228 litres; compression ratio, 5.5 to 1; normal power, 32 h.p. at 2,900 r.p.m.; maximum power (for 5 minutes), 36 h.p. at 3,200 r.p.m.; petrol consumption at normal power, 9 litres per hour; oil, 0.57 litres; weight of engine, 45.36 kgs.

It is regretted that conditions at the Grand Palais were such that it was found difficult to photograph the Bristol engines on the stand, but some very excellent photographs appear elsewhere in this issue of *FLIGHT*.

BREITFELD, DANEK I SPOL

THIS Czechoslovak firm, of Prague, commenced the manufacture of aero engines as long ago as 1914, when the types produced were built under licence from the "Hieronymus" company. In 1922 the firm commenced original design, the first proprietary engine to be turned out being the "Blesk," a six-cylinder vertical water-cooled of 100 h.p., having a bore of 120 mm. and a stroke of 140 mm. This engine was successful within the limits imposed by a low-power output, and further types were then developed. The outcome has been a series of three engines, all of the high-compression type, designed to maintain their power up to an altitude of 3,000 m.

The "Perun I" is a six-cylinder, vertical water-cooled of 190 h.p., having a bore of 150 mm. and a stroke of 180 mm. Its normal speed is 1,400 r.p.m., and the petrol consumption is 190 grs. per h.p./hour, while the oil consumption is 12 grs. per h.p./hour. The weight of the engine dry is 285 kg.

"Perun II" is a slightly more powerful version of the same type, with a bore of 160 mm. and a stroke of 190 mm., developing 240 h.p. at a normal speed of 1,400 r.p.m. Its weight is 315 kg., and the petrol consumption is 190 grs. per h.p./hour, while the oil consumption is 12 grs. per h.p./hour.

The most powerful engine produced by this firm up to date is the 500 h.p. "BD," a 12-cylinder water-cooled Vee type with a bore of 160 mm. and a stroke of 190 mm. The normal speed is 1,400 r.p.m., and the weight of the engine is 550 kg. Whereas the smaller models have two valves per cylinder, the "BD" has four. This engine also is claimed to maintain its power up to an altitude of 3,000 m.

THE "CAFFORT" ENGINE

In some ways the most interesting engine at the show, because it represents an attempt at solving the problem of engine-head resistance, is the new 500 h.p. engine designed and constructed by the French firm of Caffort Frères, which is exhibited at Paris next to the Bristol stand. This engine, which is apt to

be overlooked, is well worth an inspection, and, although relatively little information is available concerning it—the engine having been but recently finished, and, in fact, was running a couple of days before the opening of the Salon—the general principle is simple enough and easily followed. That some of the details may require modification before this engine becomes a practical proposition is, of course, more than likely. The firm that has produced it is, we understand, a very old French firm, but has had no previous experience of aero-engine work, so that one should not be over-critical in judging detail.

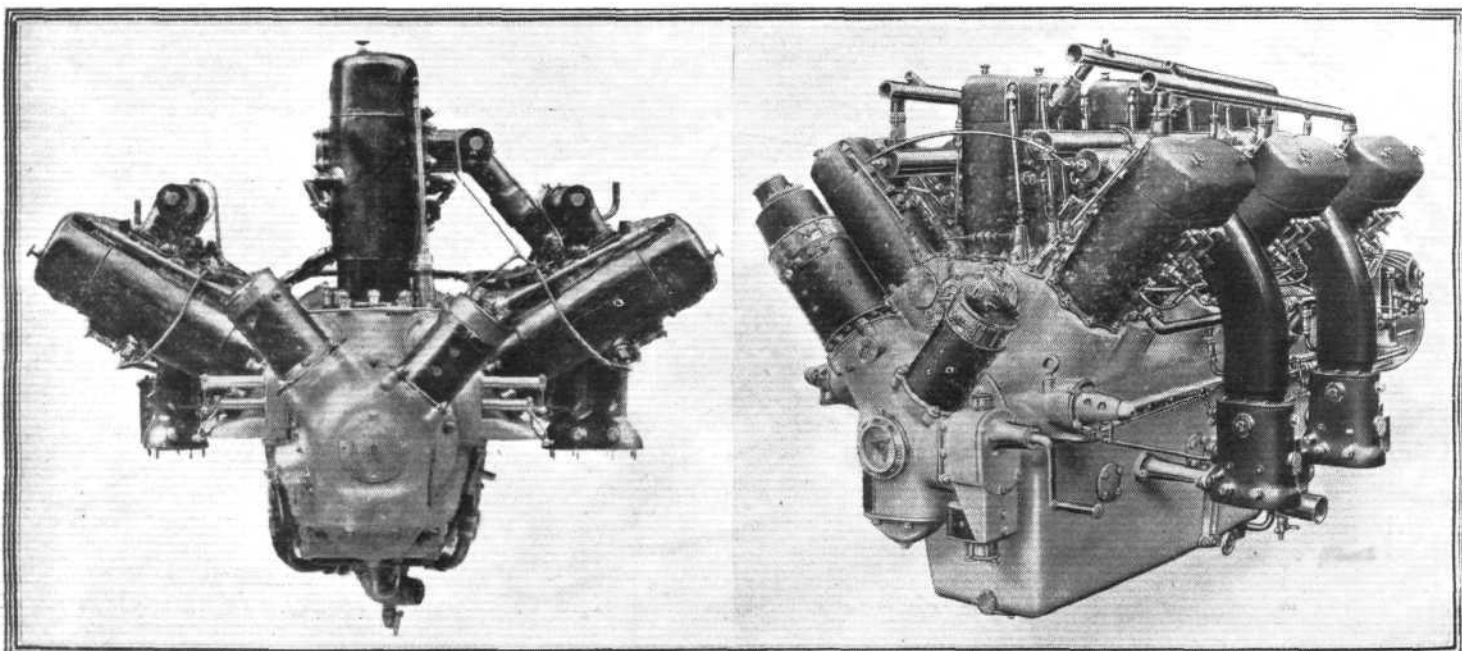
The main principle of the "Caffort" engine is that it has its 12 cylinders disposed in two rows of 6 each, the two rows being horizontal and placed at an angle of 180°. In other words, the engine is of the horizontally opposed type. We gather that the object which the designer had in view was to produce an engine capable of being tucked away neatly inside a thick wing, thus saving the head resistance offered by the more orthodox types of engine. This being the object, water cooling was adopted as a necessary corollary, and there still remains the problem of the radiator and its head resistance. That, however, is a matter over which the engine designer has little or no control. It must rest with the aircraft designer, and, presumably, the wing-surface type of radiator would be the logical type to adopt in conjunction with the "Caffort" engine.

It is regretted that the lighting arrangements of this year's Paris Salon were such that it was found impossible to take photographs of quite a number of interesting exhibits, and among these was the "Caffort" engine. The preliminary test runs of this engine were carried out so recently that the firm has had no time to have photographs taken, and it is therefore impossible for us to place before our readers any illustration of it. The following brief notes on its more important features will have to serve for the time being.

As already mentioned, the "Caffort" engine is of the horizontally opposed type. Each bank of cylinders lies horizontal, and the overall depth of the engine is very small indeed. Thus, even when used in the ordinary way in the nose of a fuselage, the engine would give a particularly good view over the top from the pilot's cockpit, and for this reason alone the type might be worth developing, quite apart from its obvious suitability for mounting in the interior of a thick wing.

The cylinders are water-jacketed in the normal way, and the overhead valve gear is entirely enclosed in casings. It was pointed out that these casings could, in future engines, very easily be lightened since they do not have to take any stresses and in this way alone it is thought that about 100 lb. could be saved in the weight.

The crankshaft has three pairs of crankpins each pair being placed at an angle of 120° in relation to adjacent ones. Opposite cylinders have one connecting rod taking its big end bearing direct on the crankpin, its "opposite number" having an articulated connecting rod. The crank-



ENGINES AT THE PARIS SHOW: Two Farman "broad-arrow" types, on the left the 500 h.p. and on the right the 700 h.p.

shaft, incidentally, is in three pieces. There are four valves per cylinder, the inlet valves being underneath and the exhaust valves on top. Four carburettors are fitted, one at each "corner" so to speak, each carburettor supplying three cylinders.

The engine can be used either as a direct drive, or as a geared-down engine, the same front cover being used in either case, and the transformation from geared to direct drive being carried out merely by removing two spurs from the front of the crankshaft. When geared the ratio of engine speed to propeller speed is in the order of 2,000 to 1,060 r.p.m. The engine can be used either as a tractor or as a pusher.

The main data relating to the "Caffort" engine are as follows: bore, 145 mm.; stroke, 150 mm.; cubic capacity, 29.742 litres; volumetric compression pressure (cold), 5.3 kgs.; normal speed, 2,000 r.p.m.; normal propeller speed, 1,060 r.p.m.; power, 500 b.h.p. at 2,000 r.p.m.; petrol consumption, 250 gr. per horse-power/pr. hour; oil, 20 gr./h.p./hr.; weight of engine, 600 kg.

It is believed that the power will later be increased to 600 h.p., while the weight can be considerably reduced. In this first experimental engine no attempt has been made to cut the weight down.

THE FARMAN ENGINES

In view of the fact that but few changes have been made in the Farman engines since the last Paris Aero Show in 1924, and that such alterations as are found are for the most part minor ones dictated by considerations connected with the manufacture of the engines, there is little need for a detailed description here. On the Farman engine stand are exhibited one of the 500/550 h.p. broad arrow type 12 WE engines and one 700 h.p. engine, also of the broad arrow type (the 18 cylinder 18 WD), and a partly stripped 500 h.p. type which, a placard announces, has flown, in a Farman F.170 machine, 50,000 km. in 300 hours, officially controlled by the S.N.Ae.

The Farman 500 h.p. engine has annexed, in one year, no less than 14 world's records, including altitude with useful load of 2,000 to 6,000 kg., duration without landing 45 hours 12 mins., and distance without landing 4,400 km.

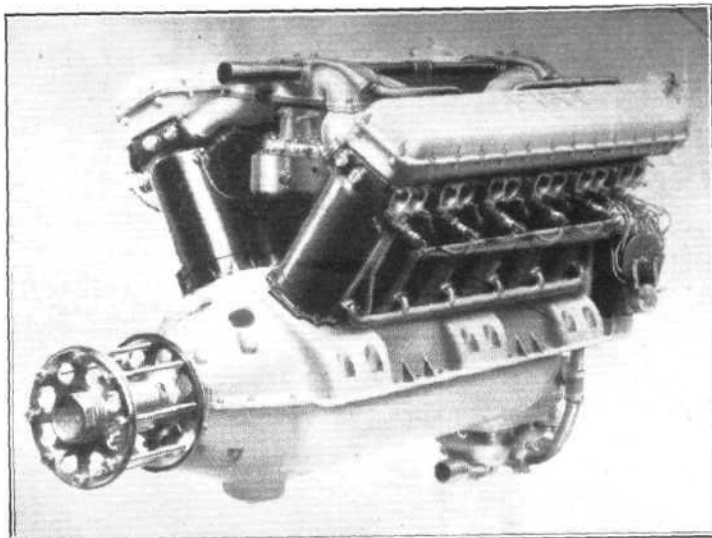
The Farman type 12 WE has the following characteristics: Bore, 130 mm.; stroke, 160 mm. Compression ratio, 5.5 to 1 or 6.5 to 1. Nominal power, 500 h.p. at 2,130 r.p.m.; maximum power of low compression type 540 h.p. at 2,200 r.p.m. The geared type can be supplied with two different ratios: 2 to 1 and 1.53 to 1. Petrol consumption 230 gr. per h.p. per hour. Oil 10 gr. per h.p. per hour. Weight of direct drive engine, 470 kg.

The 700 h.p. type 18 WD engine is similar to that shown at the previous Paris Aero Show, but the power has been increased from 600 h.p. to 700 h.p. by increasing the speed from 1,750 r.p.m. to 1,850 r.p.m., and by other minor improvements. It has a bore of 130 mm. and a stroke of 180 mm. Like the smaller engine, it is supplied with two compression ratios: 5.5 or 6.5 to 1. The nominal power of 700 h.p. is

developed at a speed of 1,850 r.p.m., while a maximum power of 820 h.p. is developed at 1,920 r.p.m. The geared-down type can be supplied with two different ratios: 2 to 1 and 1.53 to 1, as in the case of the smaller engine. The petrol consumption is 230 gr./h.p./hr., and the oil consumption 10 gr./h.p./h. The direct drive engine weighs 725 kgs.

THE FIAT ENGINES

It had been hoped that the Paris Aero Show would have afforded an opportunity of examining the Fiat engine fitted in the Macchi monoplane on which Commandant de Bernardi won the Schneider Cup seaplane race at an average speed of 396.6 km./h., and on which he later established a world's record for seaplanes by flying over the measured straight line course at an average speed of 416.605 km./h. Unfortun-

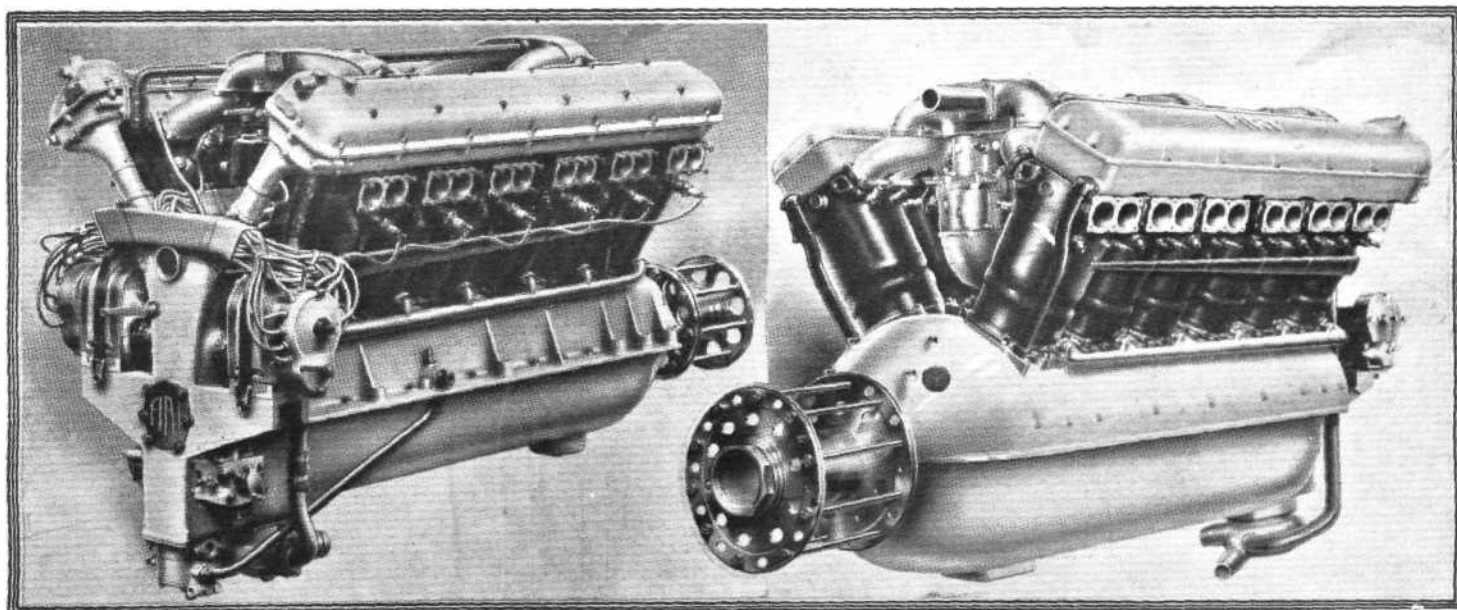


ENGINES AT THE PARIS SHOW: The Fiat A.20, 410 h.p. model.

nately, however, this engine is not exhibited, and so visitors to the Grand Palais have to be content with an examination of the A.20, A.22, and A.25 engines exhibited on the Fiat stand. All three are generally similar, are of the water-cooled 12 cylinder Vee type, and are very "clean," much of the neat appearance doubtless being due to the placing of the carburettors between the cylinder banks.

The Fiat A.20 has a bore of 115 mm. and a stroke of 150 mm. The cubic capacity is 18.7 litres, and the engine develops a normal power of 410 h.p. at 2,060 r.p.m., and a maximum of 455 h.p. at 2,400 r.p.m. The weight dry is 336 kg., and with water 346 kg.

The A.22 is a slightly more powerful engine of the following



ENGINES AT THE PARIS SHOW: The Fiat A-22 model, a 12-cylinder "V" of 550 h.p. and the A-25, 900 h.p.

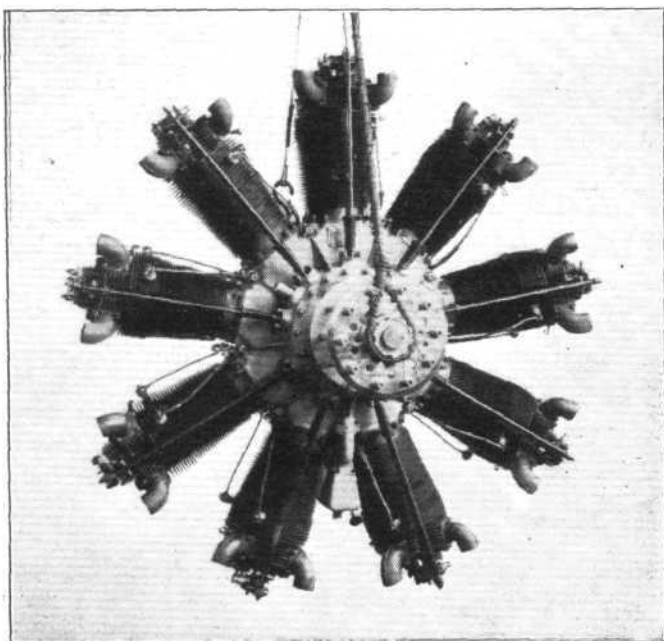
characteristics: Bore, 135 mm., stroke, 160 mm.; cubic capacity, 27.9 litres; normal power, 550 h.p. at 1,900 r.p.m.; maximum power, 590 h.p. at 2,100 r.p.m.; weight, dry, 444 kg.; weight with water, 460 kg.

The large A.25 type has a bore of 170 mm., a stroke of 200 mm. and a cubic capacity of 54.5 litres. Its normal power is 900 h.p. at 1,750 r.p.m., and maximum power 980 h.p. at 2,000 r.p.m. The weight of the engine dry is 812 kg., and with water 849 kg.

Although the Schneider Cup engine, the type AS is not exhibited, and in spite of the fact that it was illustrated in *FLIGHT* recently, it is thought that a brief specification of it may be of interest here:—No. of cylinders, 12 (60°). Bore, 140 mm. Stroke, 170 mm. Cubic capacity, 31.4 litres. Compression ratio, 6 to 1. Power, 882 h.p. at 2,500 r.p.m. Weight of engine, 412 kg.

GNOME & RHONE

ON this stand are found four engines, one 80 h.p. 1c Rhone rotary, one 120 h.p. 1c Rhone rotary, a standard Gnome-Rhone

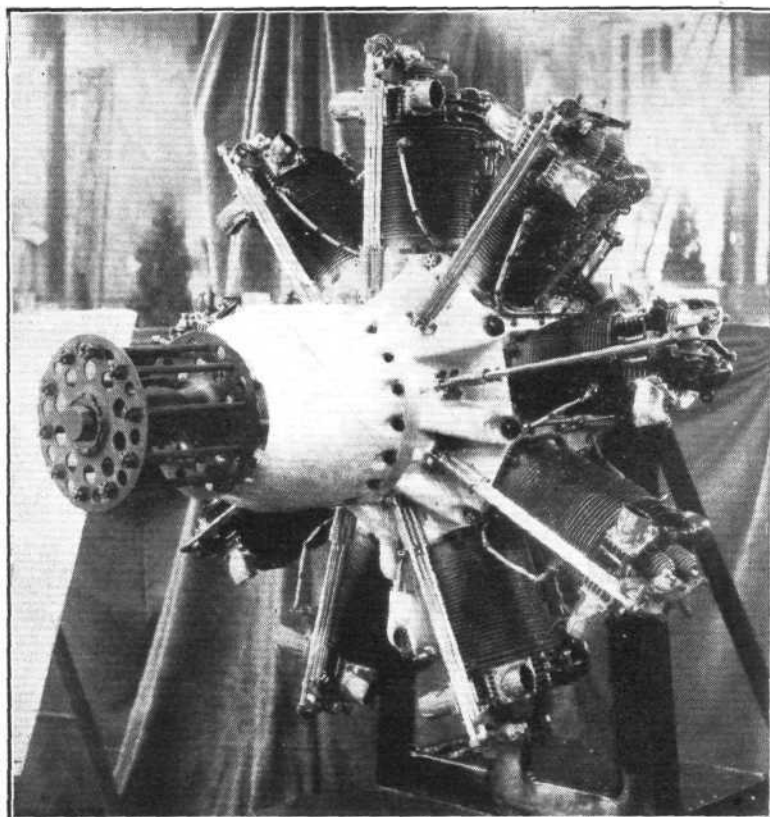


ENGINES AT THE PARIS SHOW: The French-built Gnome-Rhone "Jupiter."

420 h.p. "Jupiter," and a new geared-down Gnome-Rhone "Jupiter." The two rotary engines are of no great interest to readers of *FLIGHT* nowadays. The "Jupiter" is the standard type, as supplied in very great numbers to the French and foreign Governments, and is practically identical with the British engine. The main interest, therefore, centres in the geared-down "Jupiter," but unfortunately we have been unable to obtain any detailed information concerning this engine. The engine itself appears to be practi-

cally standard, except, of course, for such small modifications to the front of the crankcase as have been rendered necessary by the addition of the reduction gear, which is enclosed in a cylindrical casing on the front of the crankcase.

The direct-drive Gnome-Rhone "Jupiter" is supplied with three different compression ratios: 5:1, 5.3:1, and 6.57:1, the types being known as the 9 Aa, 9 Ab, and 9 Ac. In all cases the bore is 146 mm. and the stroke 190 mm., giving a total swept volume of 28.628 litres. The nominal power of the low-compression type is 380 h.p. at 1,575 r.p.m. That

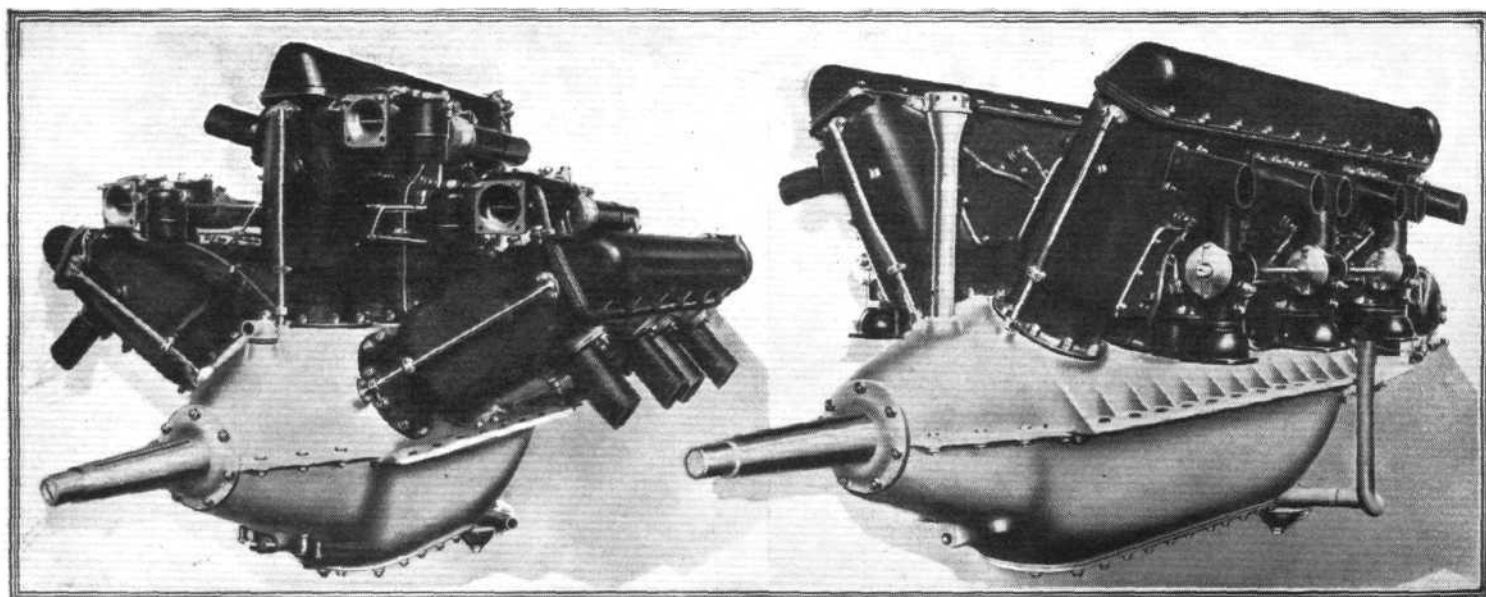


ENGINES AT THE PARIS SHOW: The 480-600 h.p. Gnome-Rhone "Jupiter" with half-reduction gear.

of the 9 Ab is 420 h.p. at 1,700 r.p.m., and of the 9 Ac 420 at 1,750 r.p.m., all at ground level. The petrol consumption, in grammes per h.p. per hour, for the three types is 235, 230 and 224 respectively, while the oil consumption is 17, 18 and 20 gr. respectively. The weight of the engine is 335 kg. in all three types.

HISPANO-SUIZA

THE Hispano-Suiza firm this year appears to have concentrated on the two 450-500 h.p. types, the 12-cylinder Vee and the



ENGINES AT THE PARIS SHOW: On the left is the Hispano-Suiza type 50 "broad-arrow" model, and on the right the type 51 "V" model, both 12-cylinder engines of 450-500 h.p.

12-cylinder "broad arrow." The former, known as the type 51, has a number of notable performances to its credit, such as, to quote from a placard displayed on the stand, the flight from Paris to Calcutta and back to Paris in 14 days, a distance of 20,000 km., and a total "mileage" of 80,000 km. (or twice around the world) without incident, flown in various flights. It was also this engine which was fitted in the world's record non-stop flight from Paris to Djask (in Persia), a distance of 5,450 km. So far, perhaps, the most meritorious performance of the broad-arrow type, 50, is the world's speed record in the Bernard-Ferbois piloted by Adjutant Bonnet (448.170 km./h.) in 1924, which has not yet been beaten. Both engines are well known, so that the following brief specifications will suffice:—

Hispano-Suiza type 51: 12 cylinders at an angle of 60°. Water cooled. Bore, 140 mm.; stroke, 150 mm. Compression ratio, 5.3 to 1. Power, 500 h.p., at 1,800 r.p.m.; maximum power, 520 h.p. at 1,900 r.p.m.; weight, dry, 420 kg.

Hispano-Suiza type 50: 12 cylinder broad arrow type, water cooled. Bore, 140 mm.; stroke, 150 mm.; compression ratio, 5.3 to 1; power, 450 h.p. at 1,725 r.p.m.; maximum power, 487 h.p. at 1,800 r.p.m.

ISOTTA-FRASCHINI

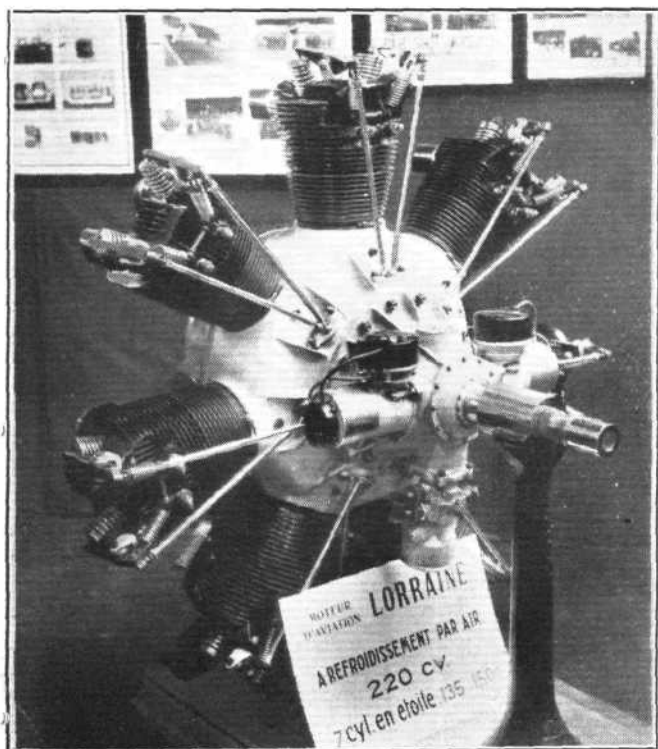
The Isotta-Fraschini company are showing five engines, of which two are old war types, and thus of no particular interest. These are the V6 and V4B vertical six-cylinder water-cooled types. The remaining three are: One V4B shown sectioned; one V6, also shown sectioned; and the modern "Asso" type, a 500-550 h.p. 12-cylinder Vee water cooled.

The main characteristics of the "Asso" are: Bore, 140 mm.; stroke, 150 mm.; compression ratio, 5.3 to 1; normal speed, 1,800 r.p.m.; weight dry, 420 kg.; weight with oil and water, 450 kg.

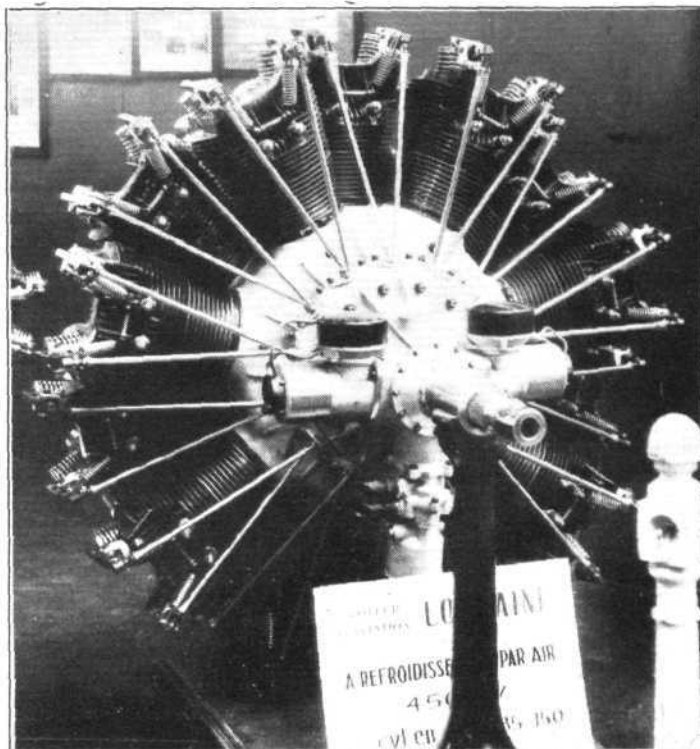
LORRAINE-DIETRICH

This old and well-known firm has an imposing display of engines on their stand. The majority, however, are of well-known type, have been exhibited before, and some of them at any rate have provided the power for some famous flights. The exhibits on this stand include the following types:—a 700/800 h.p. 12 cyl. Vee; a 650 h.p. 18-cyl. broad arrow; a 400 h.p. 12 cyl. Vee; a 650 h.p. 18 cyl. broad arrow geared; a 500 h.p. 12 cyl. broad arrow; a 450 h.p. 12 cyl. broad arrow geared, and a 450 h.p. 12 cyl. broad arrow built under licence in Spain.

Space does not permit us to give specifications of all the Lorraine-Dietrich engines, but of the water-cooled types perhaps the 700 h.p. is the most interesting. This engine is



ENGINES AT THE PARIS SHOW: The 220 h.p. 7-cylinder Lorraine air-cooled radial.



ENGINES AT THE PARIS SHOW: The 450 h.p. 14-cylinder Lorraine air-cooled radial.

of typical Lorraine-Dietrich design as regards its general lay-out, and has the following characteristics:—Vee type (60°) water cooled. Bore, 175 mm.; stroke, 225 mm. Cubic capacity, 65 litres. Nominal power, 700 h.p. at 1,200 r.p.m. Petrol consumption, 240 gr./h.p./h.; oil consumption, 19 kg. per hour. Weight, dry, 850 kg.

In addition to their many water-cooled types, the Lorraine-Dietrich firm exhibit two air-cooled types, these being the first air-cooled engines to be produced by the firm. The two engines are radial static engines, the smaller of the two being a 7-cylinder engine of a nominal 220 h.p., while the larger is a 14-cylinder radial with the cylinders arranged in two rows. This engine is rated at 450 h.p. The two air-cooled engines show quite a strong family resemblance with the Armstrong-Siddeley engines, although the overhead valve mechanism differs very considerably from that of the "Jaguar" and "Lynx" engines. These two engines must, we think, have been produced as a result of an amicable arrangement between the two firms, whereby Armstrong-Siddeley's experience has been placed at the disposal of the French firm.

But few particulars of these two engines are available, but following are the main data:—Type 47, 7-cyl. radial air cooled. Bore, 135 mm.; stroke, 150 mm. Cubic capacity, 15.02 litres. Power 200 h.p. at 1,650 r.p.m.; 220 h.p. at 1,800 r.p.m. Weight, 260 kg.

Type 42.—14-cyl. radial air cooled. Bore, 135 mm.; stroke, 159 mm. Cubic capacity, 30.05 litres. Power, 450 h.p. at 1,800 r.p.m. Weight of engine, 400 kg.

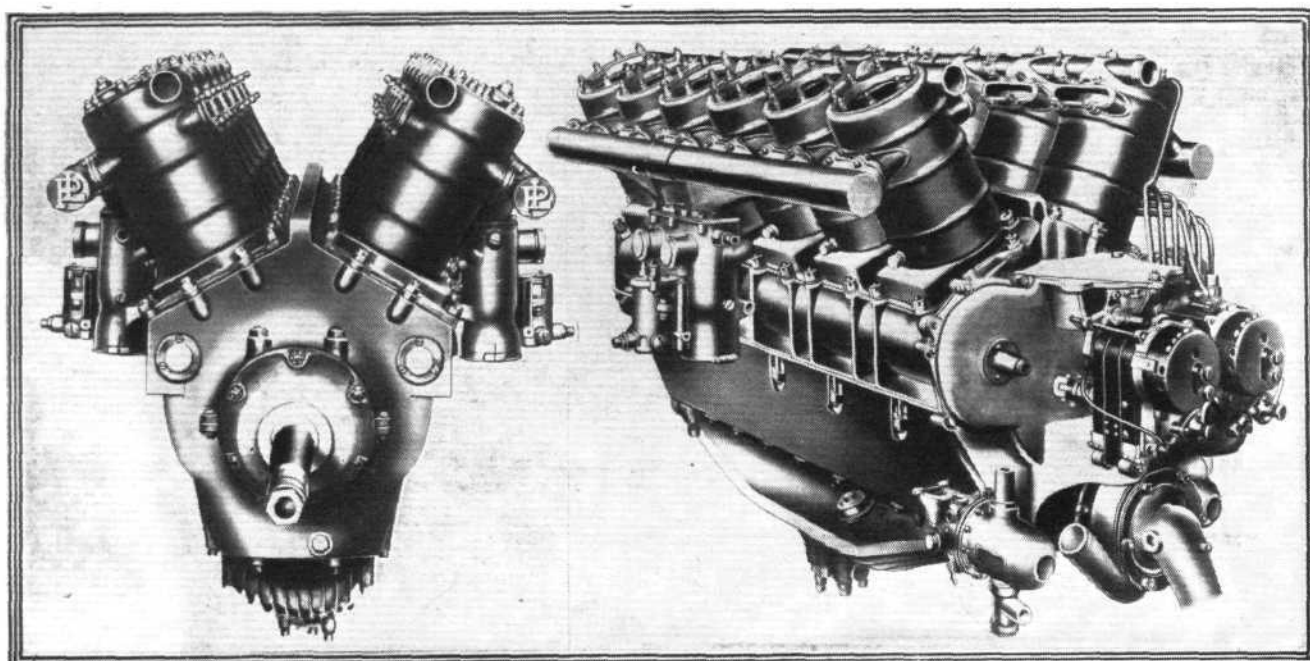
PANHARD-LEVASSOR

This firm has concentrated, at this year's Salon, on the sleeve-valve engine, called "sans soupapes" (valveless), of which two large engines are exhibited. Some smaller models illustrate the principle of operation of the sleeve valves, while a normal 12-cylinder Vee water-cooled engine is also shown.

The "Sans Soupapes" engine, type VK 122, has the following characteristics:—12-cylinder Vee type, 60° Bore, 140 mm.; stroke, 170 mm. Cubic capacity, 31.5 litres. Compression ratio, 5.4 to 1. Power at 1,500 r.p.m., 450 h.p. Power at 1,800 r.p.m., 525 h.p. Weight of engine, 545 kg.

The standard engine, type V 12M, has a bore of 165 mm. and a stroke of 170 mm. The compression ratio is 6 to 1, and the power at 1,550 r.p.m. is 500 h.p. The total weight is 590 kg.

It may be recollected that in the great aero engine competition held by the French Government some time ago, a Panhard-Levassor "Sans Soupapes" engine secured second place in the general classification, while from the point of view of fuel consumption it was the most economical of those



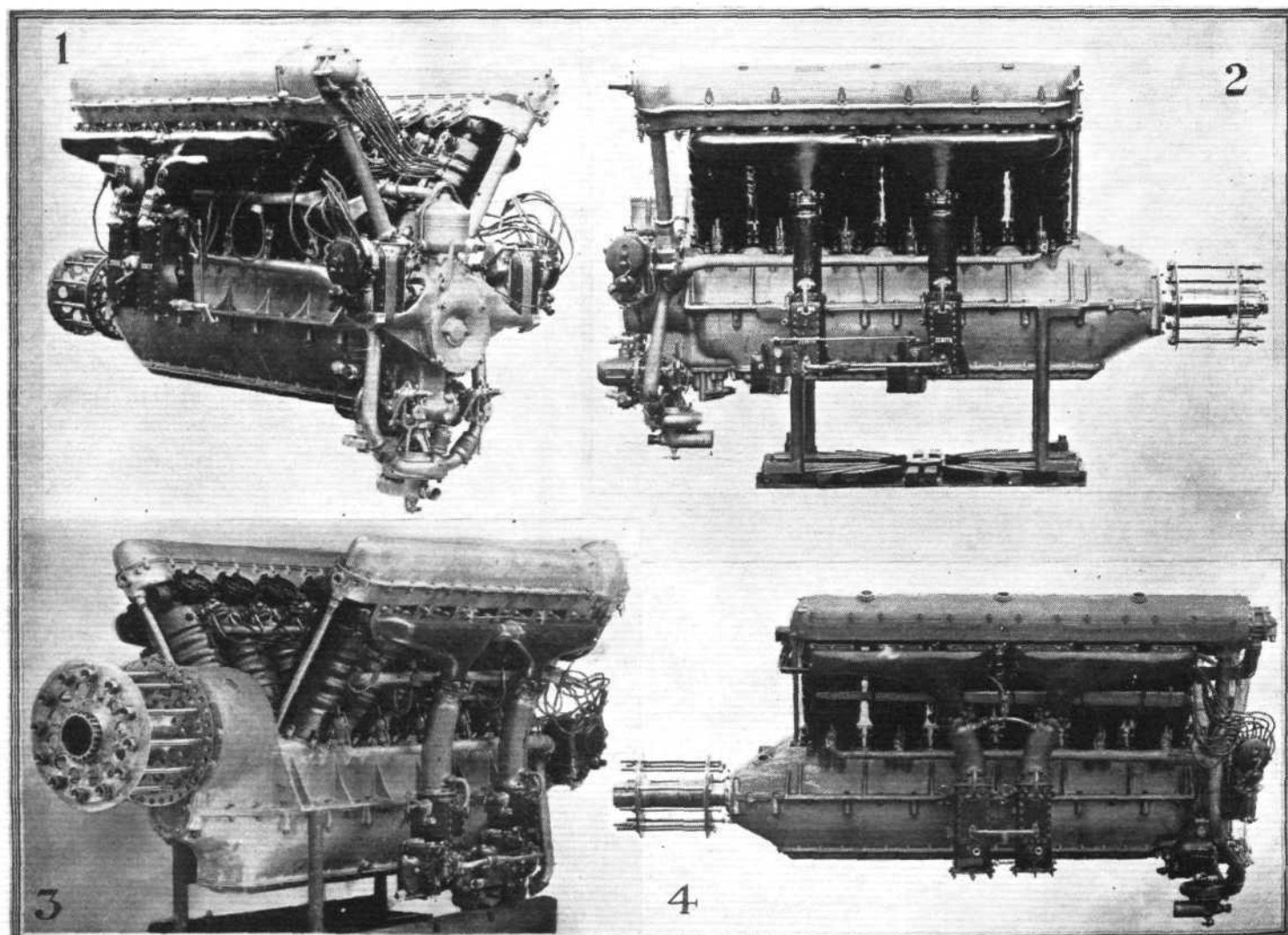
ENGINES AT THE PARIS SHOW: Two views of the 500 h.p. Panhard sleeve-valve engine.

which took part in the competition. In this connection, perhaps, we may quote from a speech made by M. R. Soreau, the distinguished president of the aviation commission of the Aero Club of France, at a banquet shortly after the completion of the competition. "Concerning the Panhard engine," M. Soreau stated, the weight per horse power was 1.260 kg. The consumption, of 243 gr./h.p./h. only, was the best in the competition. If three attempts were annulled, there was, on the other hand, not a single stoppage in the course of the 30 tests in which the engine qualified. The fact should be

emphasised that none of the incidents that happened to this valveless engine were attributable to the distribution system. This engine, which secures second place in the two classifications, is remarkable for its regularity, its low consumption, its small size. It represents a prototype of the future."

SOCIETE RENAULT

A MOST imposing stand is that of the Renault firm. On one side is a vast array of marine engines, stationary engine units, etc., while the other is devoted to aero engines. Among the



ENGINES AT THE PARIS SHOW: Four of the Renault engines. (1) The 450 h.p. direct drive. (2) The 550 h.p. direct drive. (3) The 600 h.p. geared. (4) The 700 h.p. direct. All are water-cooled "V" engines.

BRITISH AERO-ENGINE & ACCESSORIES SECTION OF 'FLIGHT'

In last week's issue of *FLIGHT* a section was devoted to British Aircraft Constructors, in which particulars were given, more or less condensed, of the work carried out and the types of machines manufactured by each firm. This, we think, provided a useful general all-round guide to the British Aircraft Industry, in so far as the complete machines were concerned; but of paramount importance is the "motive" and "minor" side of the Industry—that appertaining to the engines, accessories and other items necessary in the making and operating of aircraft.

In the following pages, therefore, our readers will find a similar résumé of the activities of British firms in this direction. First we deal with engines, a branch of the British industry that has achieved a world-wide reputation, second to no other country, for reliability and workmanship. The British aero engine, of one make or another, is finding increasing favour abroad, and numerous foreign aircraft constructors are fitting British engines in the machines they produce, whilst in some cases the engine itself is being built, under licence, in that particular country.

Following the engines our readers will find particulars relating to the more important "accessories" for aircraft, such as the very necessary fuel, and some of the fittings required in the petrol system; "Dope" for the wings and other fabric-covered parts of an aeroplane; landing wheels and tyres; wireless for aircraft—perhaps one of the most important components (for it is becoming more than an accessory) employed very largely now, on aircraft; armament for aircraft; and various aircraft instruments, including the aerial camera, which belongs to a branch of aviation, *i.e.*, aerial survey, etc., that is growing more and more important every day.

Finally, we give a few brief particulars of the "Autogiro." True, the "Autogiro" is neither an aero-engine nor an accessory—but there are some who would suggest it is *not* an aeroplane either! So perhaps it may not be necessary for us to put forward our excuse—that the material did not reach us in time—for not including the "Autogiro" in last week's Aircraft Section.



"FLIGHT" AT THE PARIS AERO SHOW.

FLIGHT is on Sale at the Grand Palais during the French Aero Exhibition and at chief places in Paris. *FLIGHT* stand is in the gallery, at the Champs-Elysees end of the building, and visitors wishing to leave messages relating to Editorial or Advertising matters should hand them to the Attendant.

FLIGHT may also be obtained from the following:—Messageries Hachette, Messrs. W. H. Smith and Son's, 248, Rue de Rivoli, and at all important News Kiosks in Paris.

A.D.C. AIRCRAFT Ltd.

TWO SUCCESSFUL AERO ENGINES

FORMED originally shortly after the Armistice—and known then as the Aircraft Disposal Co.—for the purpose of handling the very large stocks of Government surplus aircraft, aero engines, and accessories, A.D.C. Aircraft have now joined the ranks of British aero engine constructors. Their first effort in this direction was the 120-140 h.p. "Airdisco," an 8-cylinder V air-cooled engine which, fitted in such machines as the Avro type 504 and D.H. 51 has given very satisfactory results.

Two other engines were then produced by A.D.C. Aircraft, which have obtained a very satisfactory position in the ranks of British aero engines—the A.D.C. "Cirrus" and the A.D.C. "Nimbus," some brief particulars of which follow:—

THE A.D.C. "CIRRUS."

The A.D.C. "Cirrus" aero engine—of which there are two models, the Mark I and the Mark II—was designed to meet the requirements of the Light Aeroplane Constructor for a reliable power unit of low horse power at a moderate price.

From the view of the private owner, it was essential that the engine should be free from complicated mechanism, and should be easily accessible for adjustments.

No undue sacrifice has been made to obtain extreme lightness, and to achieve the desired result it was necessary to adopt a progressive and original design, differing from the light engines already available, and this necessitated considerable experiment and research.

As a result, the "Cirrus" engine was produced, and shortly afterwards successfully passed the Air Ministry 100 hours Type Test—incidentally being the first British low-powered aero engine to achieve this distinction.

In its simplicity the engine ranks with the average motor-car engine, and no specialised knowledge of aero engines is necessary to operate or maintain same.

It is a 4-cyl. in line air-cooled engine, with a bore of 105 mm. (Mark I) or 110 mm. (Mark II) and a stroke of 130 mm., the Mark I developing 60 h.p. (normal) at 1800 r.p.m. and the Mark II 75 h.p. at same r.p.m.; the maximum horse power, at 2,000 r.p.m., is in each case 65 h.p. and 80 h.p. respectively. Constructionally, the Mark I and Mark II engines differ only in details, so that the following remarks apply to both. The cylinders are of cast iron, with detachable heads of aluminium alloy carrying overhead valves. The latter are operated through rockers by push rods, the rockers being supported by brackets cast on the cylinder heads. The valve springs are of the double helical type and are interchangeable. The pistons are of aluminium alloy, fitted with two (Mark I) or three (Mark II) cast-iron rings. The hardened steel gudgeon pin is a floating fit on the piston, and is fixed in the connecting rod by a special stud and nut or circlip.

The connecting rods are of H section, Duralumin stampings in the case of the Mark II, with the big end bearing of white metal in a bronze shell. The crankshaft is carried in five bearings, which differ in the two models—as follows:—In Mark I, three inner bearings of white metal in bronze shells, and front and rear bearings of the ball type; in Mark II these latter bearings are of the roller type. The upper portion of the crank case contains the three central crankshaft

bearings, the top half of the end bearing housings, and also the camshaft. The lower portion forms the oil sump and carries the oil pump relief valve and oil strainer, and also forms the lower half of the ball bearing housings.

The camshaft is supported on three plain phosphor-bronze bearings. All cams and bearings on this shaft are case hardened. A spiral gear on the camshaft drives the oil pump.

The latter is arranged at the lowest part of the crankcase, so that it is always primed with oil. This pump forces the oil through the gauze filter and thence through oil ways to connecting holes opposite each main bearing, the oil being thus forced under pressure directly to each of these.

The standard engine is provided with 2-4 cylinder B.T.H. magnetos, one being fitted with an impulse starter. Each magneto operates a separate set of plugs, thus providing two independent ignition systems.

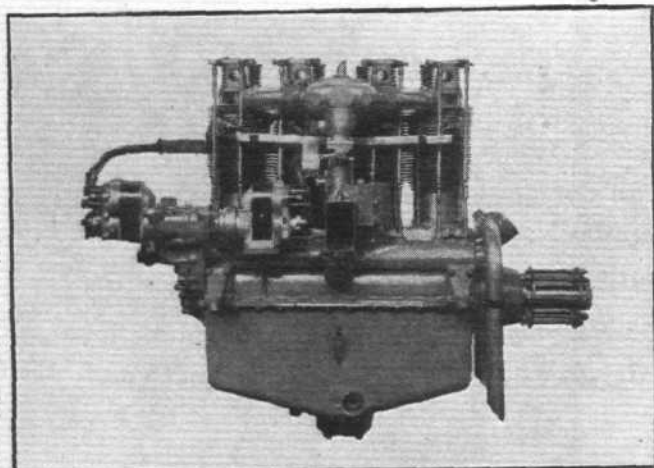
THE A.D.C. "NIMBUS"

This engine, which has passed its Air Ministry Type Tests, was developed, or evolved, from the well-known Siddeley, "Puma" engine, of which engine A.D.C. Aircraft, Ltd., holds large stocks, with spare parts. It is, however, to all intents and purposes really quite a different engine, developing a higher power, although it is designed to fit standard "Puma" bearers and several of the original "Puma" parts, where opportunity presented itself, have been incorporated in its construction. Nevertheless, it is still of the "Puma" family, especially as its designer, Major Halford, was one of those responsible for the design of the "B.H.P." engine, the forerunner of the "Puma."

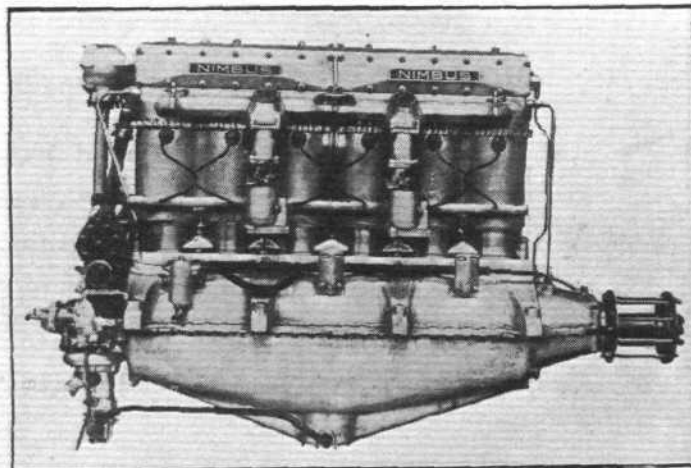
Its construction, however, differs considerably from the "Puma"; the "Nimbus" is a 6-cylinder inline water-cooled engine, with steel cylinders screwed into the bottom of the water-jacket blocks, and secured at the top to the aluminium alloy cylinder head blocks by the valve seatings which are screwed into the head-blocks. The water-jackets are formed by two aluminium castings, each block enclosing three cylinders and being secured to its respective cylinder head block by a number of bolts.

Each cylinder has one inlet and two exhaust valves, operated by an overhead camshaft—directly in the case of the exhaust and through short rockers for the inlet valves. In fact, the valve gear is much the same as in the "Puma." An entirely new and considerably strengthened crankshaft is, however, fitted in the "Nimbus," whilst aluminium alloy pistons of special design are employed, which, although of larger bore, are lighter than the original. Finally, it may be added, that the outstanding features of the "Nimbus" are:—Lightest engine per h.p. of its type; exceptionally low petrol consumption; installation interchangeable with "Puma"; small frontal area.

Specification.—Bore, 152 mm.; stroke, 190 mm.; compression ratio, 5.4:1 normal r.p.m., 1,450; maximum r.p.m., 1,600; normal b.h.p. (at 1,450), 305; maximum b.h.p. (at 1,600), 335; petrol consumption, at 305 h.p., 0.58 pts. per/h.p./hr.; oil consumption, 0.017 pts. per/h.p./hr.; weight, dry, in running order (less radiator and water), 670 lb.; weight per h.p. (as above), 2 lb. (approx.).



The A.D.C. "Cirrus."



The A.D.C. "Nimbus."

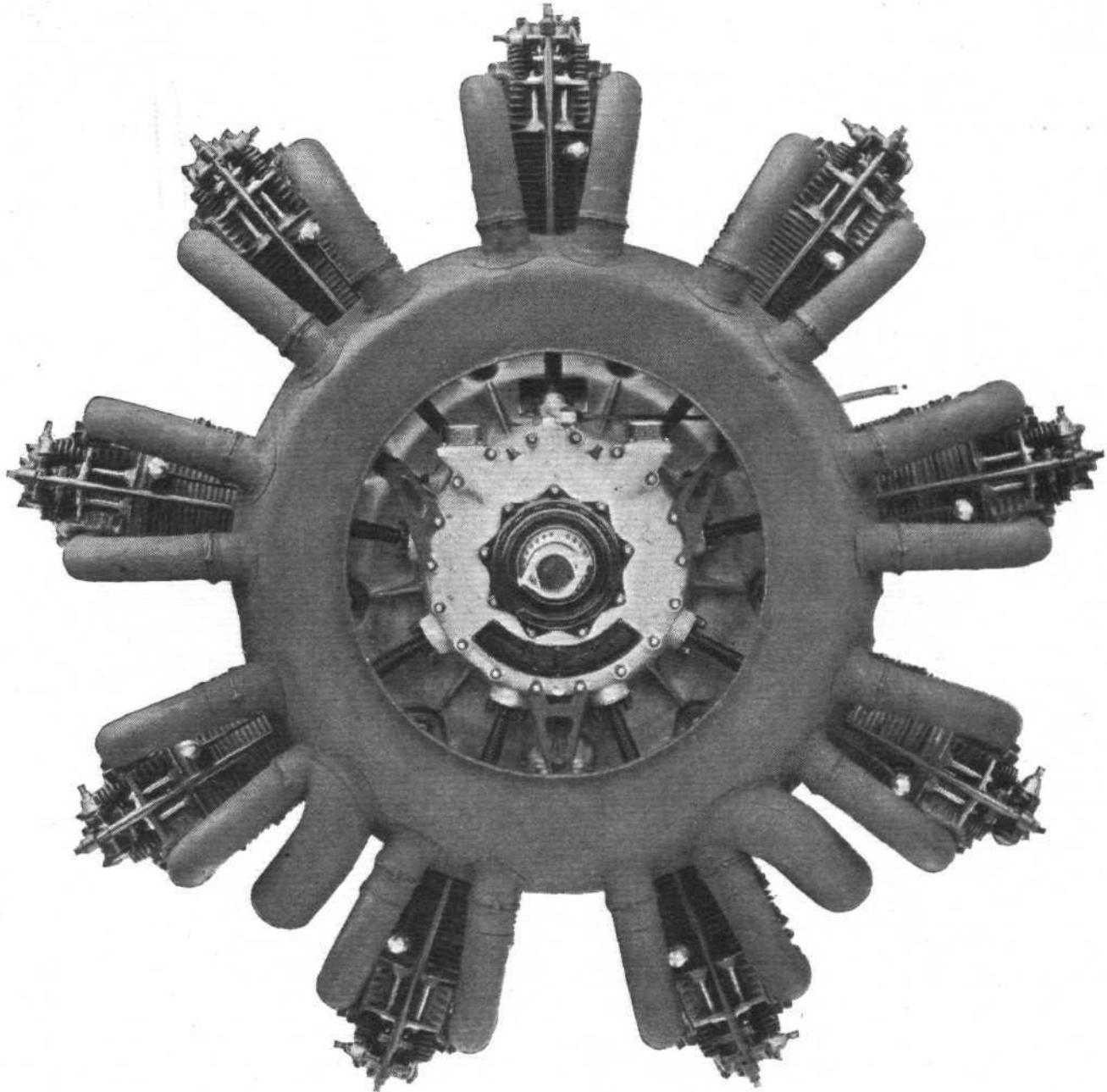
The BRISTOL AEROPLANE Co., Ltd.

Bristol Aircooled Aero Engines

Setting a Standard to the World

THE "Bristol" Jupiter radial aircooled aero engine is recognised throughout the world today as the ideal power unit for all types of military and commercial aircraft by reason of its proved high standard of reliability and efficiency. So wide has been the recognition of the qualities of the engine

replacement of any kind as has the "Bristol" Jupiter. It is worthy of comment that when this engine was stripped down for inspection after its 225 hours' running the official report stated that the condition was excellent and the engine ready for further service after the replacement of one valve and spring. Since that time, the same engine has completed



The "Bristol" Jupiter Series IV.

that licences have been granted for its manufacture in France, Italy, Czecho-Slovakia and Japan, and today Jupiter engines are in service in most parts of the world in which flying is undertaken, including Great Britain, France, Poland, Germany, Norway, Sweden, Czecho-Slovakia, Italy, Russia, Roumania, U.S.A., Chile, Japan, Finland, Holland, Latvia, Netherlands, East Indies, etc., in increasing numbers. At the present time probably more machines are being constructed throughout the world to take the Jupiter than for any other type of engine.

The reasons for the supremacy of the Jupiter engine are not hard to seek, for the excellence of the features embodied in its design have been fully proved out in flying service. That the Jupiter is the lightest and simplest engine of its power are points of importance; but more important still is the fact that combined with lightness and simplicity the engine has proved to possess a standard of reliability and efficiency eclipsed by no other power unit. No other aero engine, and indeed, no motor car engine, has ever completed an officially controlled flight of 25,000 miles without a

several notable flights, including a record journey from London to Cairo in 50½ hours.

As the Jupiter engine is aircooled its running is unaffected by variations of climate and temperature. Within the Arctic Circle in Sweden, during the torrid heat of the Mesopotamian summer, and under the warm conditions during the French campaign in Morocco, the Jupiter engine has proved its worth. As a result of the manner in which it demonstrated its high standard of efficiency in Morocco, a report was forwarded to the French Ministries of War and Marine by Marshal Petain, highly eulogising the qualities of the Jupiter engine, and pointing out that it was the type of engine upon which he had been forced to rely for dependable running during the campaign.

Three models of the Jupiter are available, of 6·3 : 1, 5·3 : 1 and 5 : 1 compression. The first of these is especially suitable for use with light single-seater and other military aircraft, normally operating at altitudes of 15,000 ft. or upwards. The commercial engine, as its name implies, has

been developed especially for use in commercial machines, the lower rating ensuring longer life between overhauls and satisfactory running under a wide range of conditions and fuels. The standard engine is for machines normally operating at medium altitudes, and requiring medium power at ground level with standard fuels.

The power output of the 6.3:1 compression ratio engine at 5,000 ft., with standard fuel, is 425 b.h.p. at 1,700 r.p.m., or 465 b.h.p. at 1,870 r.p.m. At ground level, with extra benzol mixture, the power is 470 b.h.p. at 1,700 r.p.m., and 510 b.h.p. at 1,870 r.p.m. The Standard Service engine, 5.3:1 compression, gives 450 b.h.p. at 1,700 r.p.m. at ground level, and 485 b.h.p. at 1,870 r.p.m., whilst the power of the Commercial type engine is 420 b.h.p. at 1,700 r.p.m.

As an aero engine for commercial aircraft, the Jupiter has rapidly attained a leading position. The new three-engined Hercules machines of Imperial Airways, Ltd., for service on the London-Karachi route, are fitted with "Bristol" Jupiter engines, whilst the aircraft belonging to the North Sea Aerial and General Transport Company to fly between Khartoum and East Africa, has also the "Bristol" Jupiter engine as its power unit. Amongst the Continental Air Companies the K.L.M. Air Line have adopted the Jupiter engine as standard in all their machines, whilst many of the important French, Italian, and Portuguese Air Lines are also using Jupiter engines in increasing numbers. Lengthy experience with the Jupiter has proved its very high standard of economy for commercial work. The K.L.M. Air Line, for instance, flew their first engine for 211 hours before it was dismantled for inspection and in their report it was stated that the wear on the principal parts at that stage was practically nil.

Details of the Engine

The nine-cylinder Jupiter engine has a bore of 5.75 in. (146 mm.) and a stroke of 7.5 in. (190 mm.), the total stroke volume being 1,753 cub. in. (28.7 litres). The normal engine speed is 1,700 r.p.m. and the maximum engine speed 1,870 r.p.m. The "Bristol" Triplex carburettor is fitted with two B.T.H. type C.E. 9 magnetos, the weight of the engine being 730 lbs.

The Jupiter engine, although extremely robust, is very compact and convenient for installation, the grouping on the rear cover of the auxiliary drives and accessories, such as magnetos, carburettor, controls, oil pump, oil filters, gas distributor, gun gear and tachometer drive, ensures the necessary protection for these components, whilst allowing of a simple form of cowling, with a detachable rear panel, giving ready access to all components.

The crankcase is in two main portions, and is machined from duralumin stampings. The crankshaft is of the built-up type and manufactured from hardened and tempered 60-ton nickel chrome steel stampings. The master rod and the eight articulated rods are also machined from 65-ton nickel chrome steel stampings. The pistons are of cast aluminium alloy of the slipper type, carrying two gas rings and one oil scraper ring of special design.

The cylinders are of composite construction; the barrels, machined from alloy-steel forgings, have an integral combustion head from which the overhead valves, two inlet and two exhaust, are seated direct. The head, which embodies the valve ports and carries the valves, valve guides, and rocker mechanism, is of cast-aluminium alloy of high heat conductivity, and is secured to the steel barrel by studs and set screws, a faced joint being made with the cylinder barrel to ensure the maximum heat conductivity.

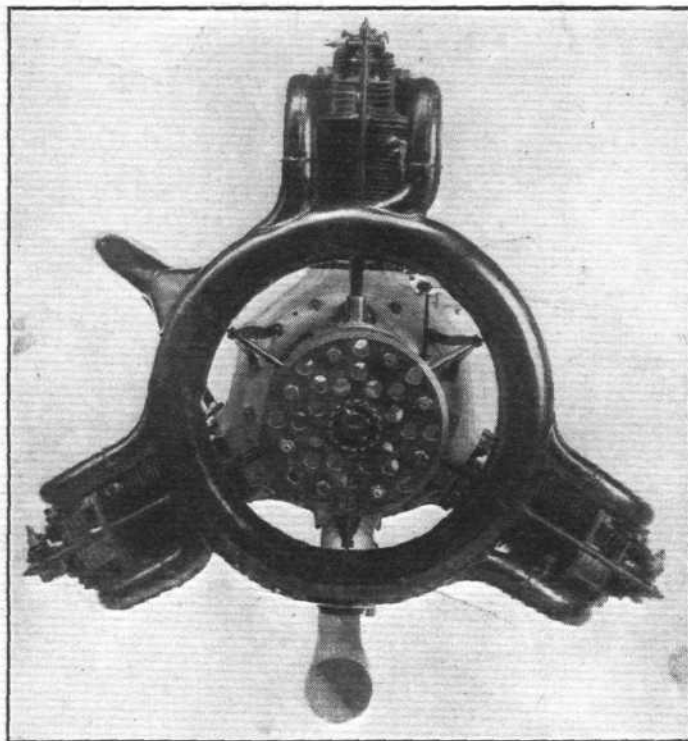
The two-row, large-diameter, four-lobed cam runs concentric with the crankshaft front end and is driven from it by eccentric epicyclic gearing at one-eighth engine speed in an anti-crank direction, operating by tappets and push rods the overhead rocker gear. This rocker gear is a special feature of the engine, the rockers being mounted on a bracket secured at one end to the cylinder-head and at the other by a tie rod to the crank-case. This arrangement compensates for the radial expansion of the cylinders when hot and automatically maintains the desired valve clearances under all running conditions.

The "Bristol" Triplex carburettor which is fitted consists of three variable-jet carburettors formed in one body and operated by one set of controls. The variable jet greatly facilitates tuning and gives an exceptional range of altitude control, as borne out by the results of official tests in high-altitude scouts. At the same time, great fuel economy is obtained, as was evidenced during the 1926 Zenith Cup Competition, when a Farman machine fitted with Jupiter engine was the winner in this essentially fuel-economy trial. A special air-intake elbow, heated by the hot oil drawn from the engine by the scavenge pump, prevents any possibility of

the freezing up of the carburettor, and to ensure a thorough atomisation of the mixture, the induction elbow is exhaust-heated. A special exhaust system has also been developed, particularly for the "Bristol" Jupiter Series VI engine; the diameter of the ring has been reduced and the down pipes kept within the cylinder outline, in order to cut down head resistance. Particular attention has been paid to the design and manufacture of the exhaust rings to ensure their being interchangeable, special non-corrosive alloys being used, making the life of the rings indefinite. To simplify the installation, the rings are entirely supported from the engine, and lugs for the attachment of the cowlings are provided on the periphery of the ring.

The 120 h.p. "Bristol" Lucifer Engine

The 120 h.p. "Bristol" Lucifer engine is a three-cylinder unit of great simplicity intended primarily for use in instructional and small commercial aeroplanes. Wherever this engine is in use excellent results have been obtained. In one flying school, for instance, in which six Lucifer-engined



The "Bristol" Lucifer.

machines have been in service for 3½ years, during which about 600 pupils have received training, there has never been a single forced landing from engine trouble. Reports from Chile, where Lucifer-engined aircraft are used for the training of Chilean Army pilots, are equally satisfactory and contain the statement that the petrol consumption is about 20 litres per hour and oil consumption about ¾ to 1 litre per hour.

The "Bristol" Lucifer engine contains the minimum number of parts and can be kept in good running order by any average mechanic.

The "Bristol" Cherub Engine

For the past three years the "Bristol" Cherub engine has been recognised as the most successful light aircraft engine in the world, and it has never yet taken part in any flying competition in any country in which it has failed to gain premier awards. During the 1924 and 1925 competitions at Lympne, aircraft fitted with the Cherub engine swept the board. In the 1926 *Daily Mail* competition for reliability and fuel economy, the only four machines which completed the course were fitted with the Cherub engine. In America and Germany its successes in air meetings have been no less remarkable, and during the past few weeks a noteworthy flight in a small two-seater monoplane fitted with a Cherub engine was carried out by Mr. Eberhard von Conta. The journey was from Munich to Rome, during which the whole Alpine system was crossed, an altitude of 14,750 ft. having been attained. On arrival in Rome the machine took part in the 200 km. race for the Coppa d'Italia, for which the pilot was awarded a silver medal, and a return flight was afterwards made to Germany.

D. NAPIER & SON Limited.

THE NAPIER "LION"

A BRITISH ENGINE OF WORLD RENOWN

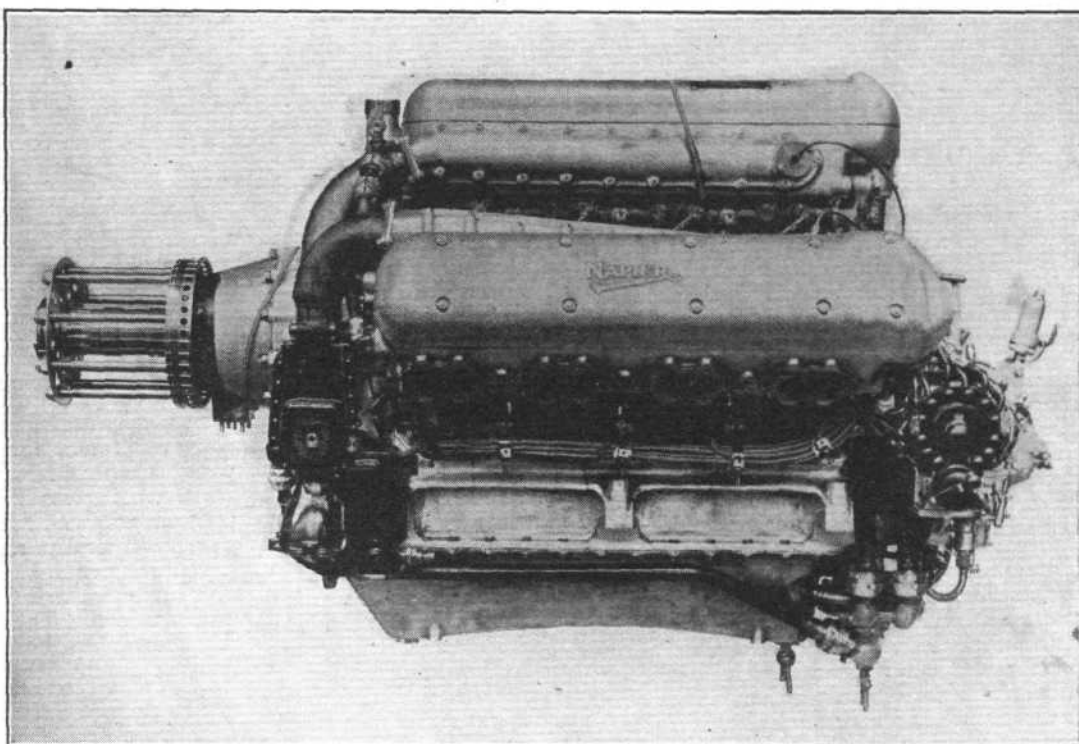
MANY years ago the writer was making a journey by air when the weather was anything but pleasant. Fog had been met soon after leaving the ground and for hours the machine was flying over continuous banks of fog. During that flight the thought was continually recurrent of what a great responsibility rested upon the engine—what care, thought and excellence of workmanship and materials must be expended in the production of this Napier engine which had gained the confidence of the pilots to the extent that they would rely upon it in such weather with passengers.

welded to them pressed sheet steel water jackets—these made in two halves and welded on vertical seams—each cylinder and jacket forming thus a separate unit.

These units are assembled into lines of four, held together at the crankcase in the usual method, and at their heads by the combined cylinder head and camshaft casing which is common to all four cylinders of one row.

The head of the cylinder proper is merely a flat machined steel surface provided with orifices for the four valves and their seats. These valve seats, which are separate and replace-

The Napier
"Lion" Engine:
Side view of this
famous aero
engine, which
develops 450 h.p.



To see the construction of the engine is sufficient to understand why such confidence can be placed in this famous British motor.

To follow the manufacture of the engines through, from the time the specially Government-tested material first enters the factory at Acton to the time when the completed engine is undergoing its final test before delivery, is a revelation in accuracy of workmanship and thoroughness in manufacture.

When the material is first received into the works it is tested—both chemically and physically—to see that it is up to the standard which has been specified. From then, after every operation—and there are many thousands—every part is checked to see that it comes within the extraordinarily fine limits set. Thoroughness is the keynote. Nothing is left to chance and nothing is "near enough." It must be right.

Even when the engine is finally assembled and has satisfactorily completed its two-hour test on the bench, it is taken down to the last bolt and nut and every part examined to see that no sign of weakness has appeared in any part. The engine is then assembled again and given another test before delivery.

The Napier Lion has today reached an advanced stage in aero engine development. There is no other engine which has been so consistently developed as the Napier. No other engine has been tried out to such an extent in actual service.

As is well known, the Napier Lion is a twelve-cylinder engine built fan-shape in three blocks of four cylinders each. This form of construction gives a shorter crankcase, a stiffer and simpler crankshaft, and a more compact engine than does the twelve-cylinder Vee construction.

The cylinders are separate, each machined from a heavy steel forging, with the combustion head integral with the barrel. Top and bottom flanges turned on the cylinder have

able units, are flanged and screwed; they are inserted from within the cylinder barrel and screw into the head casting, securing the head to the cylinders. This cylinder head is an aluminium alloy casting and contains the induction and exhaust passages. The upper surface in addition forms the lower half of the camshaft case and carries four twin bearings for the two camshafts, the bearing for the upper end of the camshaft driving shaft, and the valve stem guides. The latter are of bronze pressed into the casting.

Of the two camshafts which are provided to each row of cylinders, one operates exhaust and the other the inlet valves, and each camshaft lies directly above the line of valves which it controls. The two camshafts are geared together by equal pinions. One of them is prolonged beyond these two pinions and carries at its end the bevel wheel which meshes with that on the camshaft drive shaft. All the cams are formed from the solid and the separation of exhaust and inlet valve cams renders the process of camshaft machining relatively simple. Each cam operates directly upon a flat head on the valve stem without the interposition of rocker levers or rollers.

The valve heads and a short length of the stem are of normal form; but about one valve diameter above the head the stem diameter is increased to, roughly, one and a half times the original diameter, and is bored and screwed internally. Into the screwed upper end the table whereon the cams impinge is screwed, and a rotation of this part relatively to the valve provides an adjustment of the valve clearance.

To lock these two portions together and prevent continual variation in clearances, an ingenious locking device is fitted. The upper end of the valve stem is cut away on two sides and forms a pair of dogs. These fit into appropriate recesses in what is known as a locking ring—a spring steel cup which is

slotted and sprung to grip tightly the edge of the tappet head and thus holds the tappet head and the valve stem from moving relatively one to the other.

Within the cylinders, pistons of aluminium alloy operate. These are of very simple design, fitted with two gas rings and one scraper ring above the gudgeon pin and one scraper at the base of the skirt. The pistons are flat topped, very short for their diameter, and are fitted with cast in steel gudgeon-pin bushes.

The corresponding cylinders in each of the three rows share one crankpin, and their impulses are directed thereto by articulated connecting rods. Of these, those pertaining to the central row of cylinders are master rods, and are of "I" section, terminating in a big end. This big end is provided at each side with a pair of lugs between which the auxiliary rods from the side cylinders are hinged.

The crankshaft is short, massive, and is hollow through all journals and crankpins. It is carried on five roller bearings, all of the packed-roller type, i.e., the rollers are practically in contact and there are no cages.

The upper crankcase is a large and somewhat complex aluminium alloy casting, with three sets of cylinder facings outwardly, and the necessary cross ribs for the crankshaft bearings inwardly, with a housing for the airscrew shaft gear cast on to one end.

The lower bearing caps are steel straps carried by studs from the webs in the upper crankcase casting.

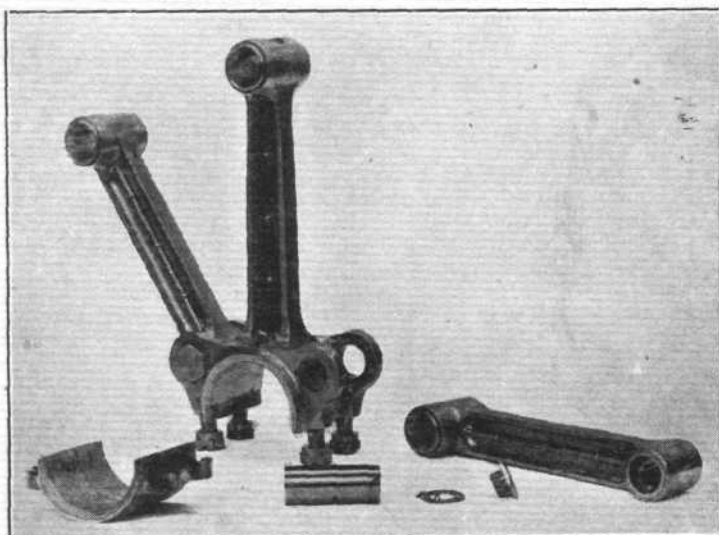
The airscrew shaft is supported by two roller bearings, one in the housing on the crankcase, the other on the bolted-on cover to the casing. Inwards from this roller bearing, and also carried by the casing cover, is a double ball thrust bearing.

The whole of the valve, pump, and magneto driving gear is external to the crankcase proper. The engine is fitted with a hand-turning gear, with a throw-out arrangement for starting.

The outer bevel drives two horizontal shafts, which actuate the two twelve-cylinder magnetos. The whole of these gears, the bearings for their shafts, the oil and water pumps, and the magneto brackets form one unit, and are built into a casing formed of two aluminium castings bolted together.

Oiling is on the dry sump principle effected by two suction pumps and one pressure pump, all of the spur wheel type. Oil is distributed in the usual manner through the hollow

in effect to three carburettors, one for each row. There are no induction manifolds in the ordinary sense of the term; instead, each cylinder head is fitted with an induction channel, in the form of an aluminium cast trough bolted to one side



One of the connecting rod units of the Napier "Lion" engine.

of the head and extending over all the induction ports, and this trough terminates at the airscrew end in a flange whereto an induction pipe may be bolted.

Ideas for this engine, which has done so much to make British aeroplanes so famous for their reliability, were first evolved in 1916. Owing, however, to other important Government work which was then occupying the factory, the first Napier Lion was not actually produced until 1918. Since then its rise—literally and figuratively—has been phenomenal.

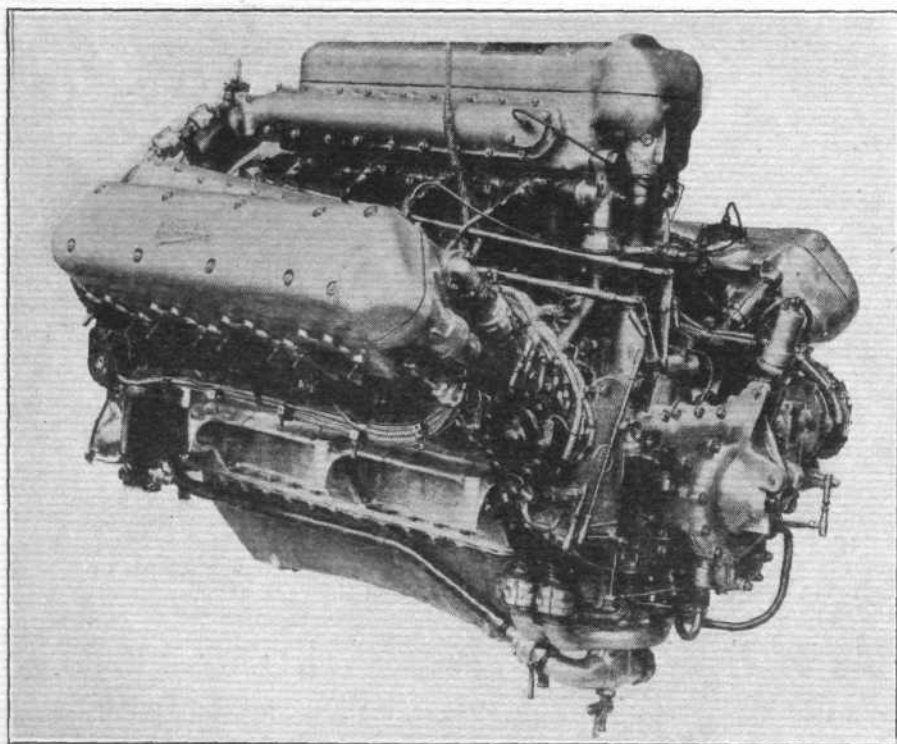
Almost on the first flight it was taken to a height of 30,500 ft.—undoubtedly a world record at that time, although as it was carried out with a Service machine, no such claim was made.

Each year since has added further laurels to the Napier Lion, whilst 1926 has shown how much this engine does predominate in the world of aeronautics.

During this year the Royal Air Force carried out three long-distance Service flights; in every case the engines selected have been the Napier Lion, which gives some idea of the popularity of this engine with the British Air Ministry.

The first was carried out by four Royal Air Force Fairey machines, each fitted with a single Napier Lion engine. A total engine mileage of 56,000 was flown, and it was the first occasion on which a number of aeroplanes, flying in company, had carried out without a hitch an extended journey in different climates and in such varying temperatures as is met on a flight from Cairo to Cape Town and back again to England. The four machines covered this distance without any trouble of any nature, and without engine renewals or stoppages, or worry of any kind. A noteworthy feature about this flight is that no trouble was experienced at the high altitude aerodromes where the take-off is likely to be difficult owing to the rarefied nature of the air reducing the efficiency of the engines.

The second Service flight was by two Supermarine "Southampton" flying-boats, each fitted with two 450 h.p. Napier aero engines. This was the first long-distance foreign cruise by Royal Air Force flying-boats. The flight was carried out to a set time-table, with full service load, and was adhered to throughout the journey from Plymouth to Alexandria and back again to England, a total engine mileage of



The Napier "Lion" engine: Three-quarter rear view.

crankshaft to big-end and gudgeon-pin bearings, the splash from these serving the cylinders. A separate lead from the pressure pump delivery passes to the camshafts (also hollow), and the overflow falls back to the crankcase passing the reduction gear casing *en rou'e*.

Gas is supplied to each row of cylinders by what amounts

27,000. No trouble whatever was experienced with the aircraft or engines.

The third flight was carried out by two Vickers' troop carriers, each fitted with two 450 h.p. Napier Lion engines, and the journey from Cairo to Aden and back was carried out without mechanical trouble, a total engine mileage of 18,000 being covered. It is of interest to note, as showing the consistency of the Napier engine, that in each one of these flights the engines were taken from store in the ordinary way, and were not specially tuned up for the strenuous flights they had been chosen to undertake.

Another achievement carried out in 1926 was the remarkable flight by Commandante Franco, the famous Spanish aviator, who piloted a Dornier Wal flying boat fitted with two Napier Lion engines, from Spain to Buenos Aires, a total distance of 6,259 miles, in 59½ hours' flying. This flight was carried out by a series of long hops, including a non-stop journey across the open sea of 1,440 miles. This was the first occasion on which the South Atlantic ocean had been flown without change of machine or engine.

In the last few months a most strenuous test has been carried out in Germany; a competition was arranged in order to discover the best German commercial seaplane. Out of 17 entries, only 3 survived the trials, which occupied a period of 10 days. The first prize was awarded a Heinkel machine, fitted with the only British Napier engine in the competition.

Following this success, news has just come to hand of two world records which have been awarded the winner of this competition for high altitude whilst carrying heavy loads. On the first occasion an altitude of 3½ miles was reached, with a weight of 500 kgs., and on the second occasion an altitude of 2½ miles was attained with a machine carrying 1,000 kgs. At the time of writing these records have not been confirmed by the Federation Aeronatique Internationale.

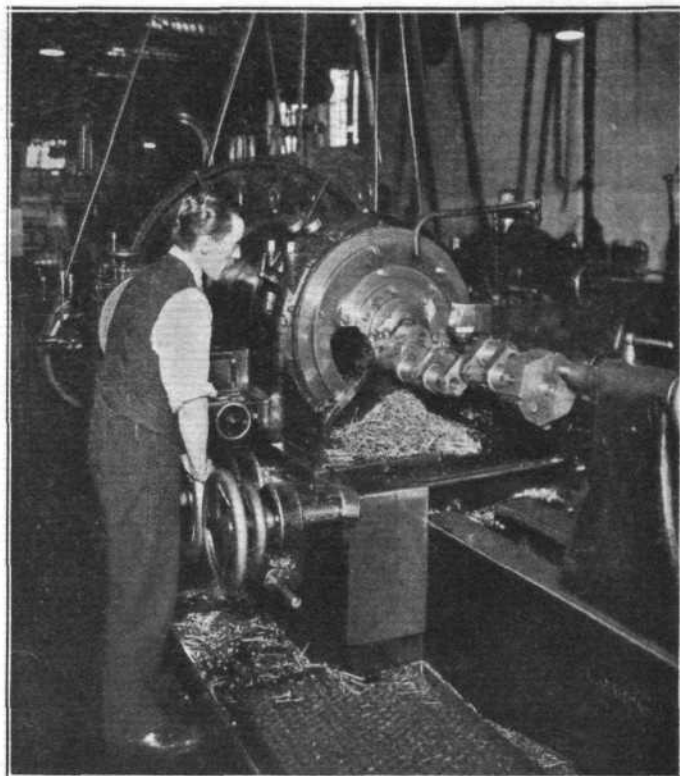
Another phase of flying where the Napier Lion has proved its wonderful efficiency is on the commercial side. Imperial Airways have in use 20 of these engines which have covered an aggregate of over 2,000,000 miles, one engine alone having flown over 200,000 miles. During the 12 months ending September 30, 1926, these Napier engines in use by Imperial Airways covered an aggregate of 566,200 miles without injury to passengers or crew.

In addition to the standard geared "Lion," the Napier Co. also manufacture a direct-drive model, which has given great success, and it is from this famous factory in London that the 1,000 h.p. Napier "Cub" was produced, which is the only engine of this high power to take the air successfully.

The Napier Co. have also achieved considerable success with a racing type Napier "Lion" engine in which the power has been increased to an amazing extent, together with considerable reduction in the weight.

The above is just a brief review of the construction and achievements of the world-famous Napier.

Apart from the British Government, over twenty countries



THE NAPIER "LION" IN THE MAKING: Machining the crankshaft.

now employ the Napier engine. This world-wide success has been achieved because of the outstanding reliability and high performance of the Napier "Lion," combined with a modern design giving a very high power-weight ratio.

Below is given a brief specification of the famous Napier "Lion," and attention is drawn to the fact that the weight of the engine dry, complete with reduction gear, airscrew boss and starter, is less than 2 lb. per horse-power developed at maximum speed of revolutions:—

Cylinders, 12 in three blocks of four each, one vertical, two at 60°; horse-power (with 5·8 to 1 compression ratio), 450 at normal speed, 2,000 r.p.m., 502 at maximum permissible speed, 2,200 r.p.m.; speed of airscrew shaft, 1,320 r.p.m.; oil consumption (average), 0·0235 lb. per b.h.p.-hr.; starter, petrol priming system and hand-turning gear; weight of engine dry, 940 lbs. (approx.); weight per horse-power developed, under 2 lb.; length overall to centre of airscrew boss, 4 ft. 9 ins. (approx.); height overall, 3 ft. (approx.); width overall, 3 ft. 6 in. (approx.).



IN THE NAPIER FACTORY AT ACTON: Checking crankshafts, etc., of the "Lion" in the View Room.

ANGLO-AMERICAN OIL Co., Ltd.

(PARIS AGENTS—L'ECONOMIQUE.)

SUCCESSFUL aircraft performance relies upon the qualities and characteristics of fuel used as much as any other item forming a part of the design of the machine concerned. The production of a fuel that will give the best results under a variety of conditions is a vast problem in itself, and that



ROUND THE WORLD FLIGHT: One of the Douglas machines, on which the American pilots flew round the world in 1919, being refuelled with "Pratt's."

this problem has been tackled with success by the Anglo-American Oil Co., Ltd., of 36, Queen Anne's Gate, S.W.1—who started marketing motor spirit suitable for aviation engines as early as 1896—is demonstrated by the large number of big aviation events, from the early days up to the present time, that have been accomplished on "Pratt's."

By way of example, to mention just a few of these historic aviation events: It was in November, 1913, that the late B. C. Hucks accomplished the feat of being the first British pilot to loop the loop and fly upside down in a specially prepared Bleriot monoplane. Subsequently B. C. Hucks carried out a long series of exhibition of looping and upside down flying.

On June 20, 1914, the London-Manchester and back air race, organised by the *Daily Mail* and "Pratt's," was won by Walter L. Brock on a Morane Saulnier monoplane (80 h.p. Gnome), who covered the total 322 miles in the then remarkable time of 4 hrs. 42 mins. 46 secs., or at an average speed of 69 m.p.h. ! It may be of interest to recall that Brock passed the finishing line within ten seconds of his handicap time.

That same year Walter Brock gained another remarkable success—on "Pratt's." This was the International Correspondence Schools, London—Paris—London race, a much more ambitious affair of 502 miles for the double journey. Brock, again flying the Morane Saulnier monoplane, accomplished the double journey in something like record time—in 7 hrs. 3 mins., 6 secs., or at an average speed of 71.5 m.p.h.

Then came the period of the Great War, in which aircraft and Pratt's played such an important part. Peace having been obtained, flying settled down once again to racing and records, and here also "Pratt's" was well to the fore. "Pratt's" was used during the historic American flight round the world, and the high quality of the fuel not only carried the airmen through without a hitch, but the elaborate arrangements for laying supplies of the fuel along the various points of the route were successfully carried out by the Anglo-American Oil Co. In this remarkable flight, it will be remembered that four U.S. pilots, Maj. Martin, Lieuts. Lowell Smith, Erik Nelson and Leigh Wade, set out from Santa Monica, California, in four Douglas biplanes (400 h.p. "Liberty") in an attempt to encircle the world via Alaska, Aleutian Islands, Japan, China, Burma, India, Iraq, Turkey, Austria, France, England, Iceland, Labrador, Newfoundland, and from New York across the United States back to Seattle. Major Martin, the leader, was forced down in Alaska during the early part of the flight and retired, but the other three proceeded, through many adventures, successfully to the end. The total elapsed time of the flight was 175 days, of which 66 were spent actually in the air; the total mileage was 27,534 and the actual flying time was 351 hrs. 11 mins.

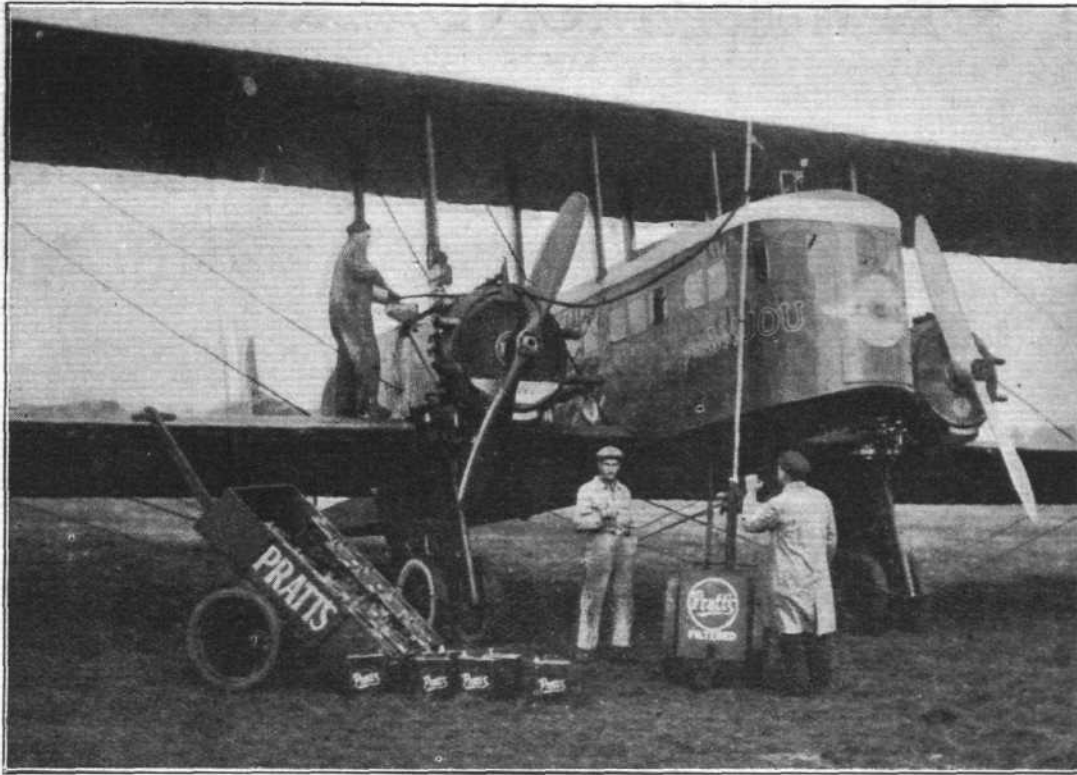
When the Japanese Airmen, Major Abe and Mr. Kawachi, who flew from Tokyo to London in 1925, set out from Croydon on October 19, for the final portion of their big flight, they filled up with "Pratt's", as will be seen from one of the accompanying illustrations.

"Pratt's" was also successful in several of the big post-war racing events, for instance, the 1926 King's Cup Race was won on this fuel by Capt. H. S. Broad, who achieved a remarkable win in this annual event on a "D.H. Moth" light 'plane, fitted with a 27-60 h.p. "Cirrus" engine, after a splendid fight against bigger and more powerful rivals. He completed the two days' 1,464 miles in 16 hrs. 22 mins. 20 secs., or at an average speed of 90.4 m.p.h.

Another "Pratt's" success in the sporting side was at



FROM FAIR NIPON: The two Breguet biplanes, on which the Japanese pilots flew from Tokio to London in 1925, fill up with "Pratt's" before departing from Croydon.



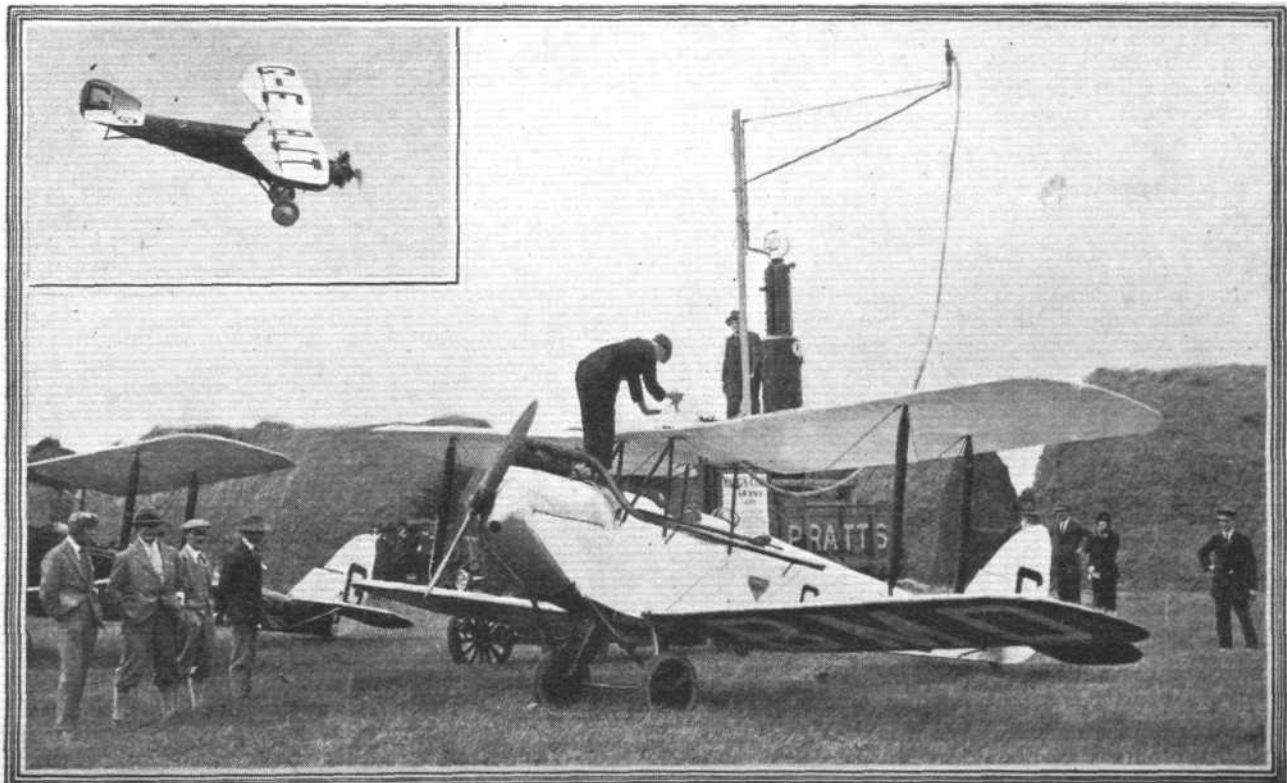
Air Services and "Pratt's": One of the French Air Union Farman Goliath air liners, employed on the Paris-London service, filling up with "Pratt's" at Croydon.

Lympne during this year's light 'plane competitions, when Mr. L. P. Openshaw made fastest time (105.5 m.p.h.) in the Grosvenor Cup Race on the Westland "Widgeon" monoplane, fitted with an Armstrong Siddeley "Genet" engine. "Pratt's" has also found success amongst the recently-formed Light Aeroplane Clubs in their sporting events.

Last, but by no means least, the Anglo-American Oil Co. has important business in connection with the commercial side of aviation, and it is hardly necessary to point out that as regards an air service, carrying passengers, mails and goods, reliability is of the utmost importance. One of the factors necessary in obtaining this reliability is, of course,

the use of a suitable fuel—and, incidentally, its supply. In this connection, the Anglo-American Oil Co. has built up a sound reputation, and it may be of interest to note that this firm handles the total business in this country of the French Air Union Co., who operate the commercial air service between Paris and London.

They have an efficient organisation, both at Croydon and Lympne, for replenishing with "Pratt's" spirit the fuel tanks of the Air Union machines during their comings and goings. At Paris and other French air ports, the Air Union's requirements are looked after by their associated company, Messrs. L'Economique, of 82, Champs Elysees, Paris.



"PRATT'S" IN THE WORLD OF SPORT: The 1926 King's Cup Race was won by Capt. H. S. Broad on a D.H. "Moth"—and "Pratt's." The "Moth" is shown above taking in its supply of fuel at Hendon. Inset is the Westland "Widgeon," which made fastest time in the Grosvenor Cup Race at Lympne last summer, using "Pratt's."

CELLON (RICHMOND) Ltd.

A FEW FACTS ABOUT "CELLON" DOPE AND ITS "BY-PRODUCTS"

It was some fifteen years ago, when various kinds of decidedly unsuitable preparations were employed for "doping" the wings of aircraft, that the Cellon firm made the first serious attempt to solve the difficult problem of proofing fabric covering for the wings and other parts of aircraft. They introduced to the aircraft industry of that time preparations known as Cellulose Acetate dopes, under the name—now world-famous—of "Cellon."

"Cellon" met with immediate success and increasing popularity, and by the year 1912, practically every important aviation event—including the winning of the Military Trials by the late S. F. Cody—was won by aircraft doped with "Cellon." In fact, "Doped with 'Cellon'" was, from then onwards, a phrase associated with very nearly every aeroplane or aviation event.

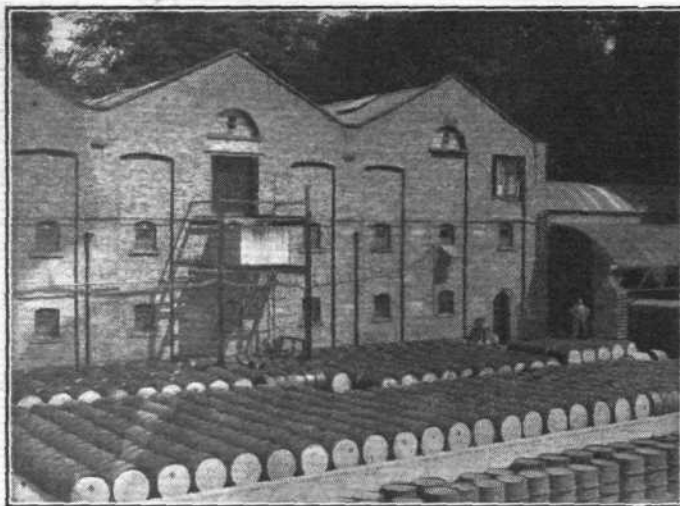
During the succeeding years "Cellon" developed very rapidly, and with the outbreak of war the Cellon firm were obliged to effect considerable extensions of plant in order to cope with the enormous demand for dope, and the present works at Richmond were established. Although the war restricted the supply of raw materials for the manufacture of dope, thus presenting numerous problems, the latter were successfully solved by the Research Department of the Cellon firm.

With the signing of the Armistice, there was naturally a falling off in the demand for dope, but after a time export problems settled down and large and ever-increasing demands for Cellon from abroad kept the Cellon Works busy. Furthermore, with the shortage of Cellulose Acetate during the war it was necessary to make certain dopes from Nitro Cellulose, and the experiments carried out in this connection at the Cellon laboratories provided some valuable data regarding the manufacture of lacquers for industrial purposes—which now forms an additional "line" of the Cellon firm.

Thus, during the last four years, "Cerric" lacquers have been gaining a reputation equal to that of "Cellon," both in the motor car and aviation industries—and others as well. These lacquers, which are obtainable in a variety of grades,

possess the advantages of being rapidly applied by means of spray; they dry very quickly and are not readily scratched or injured by the action of heat, oil or petrol.

In conclusion, here are a few recent "Cellon" successes in the world of aviation:—The R.A.F. Fairey IIID aeroplanes



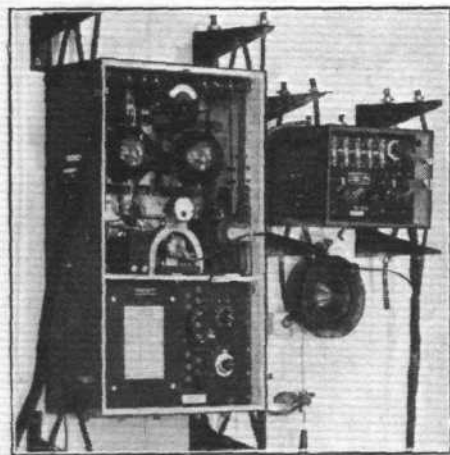
Raw Material for Dope: A portion of the outside Store Yard at Cellon Works, Richmond.

which flew from Cairo to Cape Town and back, and the two Supermarine "Southampton" flying-boats which made the Mediterranean cruise, were doped with "Cellon." In the Lympne 1926 competitions the two Hawker "Cygnet," and the Bristol "Brownie" were "Cellonites," as was the Heinkel-Napier winner of the Warnemund competition.

MARCONI'S WIRELESS TELEGRAPH Co., Ltd.

MARCONI WIRELESS APPARATUS FOR AIRCRAFT AND AERODROME SERVICES

WIRELESS plays an important and increasing part in the operation of commercial air services, and it is in no small degree due to the facilities this science offers that civil aviation has so quickly and surely reached its present position. The



The Marconi 500-watt Telephone-Telegraph Set.

Marconi Company were pioneers in this field of wireless research, as in so many others, having actively studied its problems since 1912. That their work has been abundantly justified was evidenced by Sir Samuel Hoare, the Air Minister, when, in addressing the Royal Aero Club recently, he said that wireless was now of tremendous help to pilots working in weather which a few years ago would have been regarded as impossible for flying.

For the Imperial Air routes which are being organised to link up far distant parts of the Empire large machines will be used, and powerful wireless apparatus capable of communication over great distances between machines in the air, and ground stations, will be required in the aircraft employed on these services. In anticipation of these needs, and also to cater for similar operations, such as long-distance flights with flying-boats and naval and military machines, the Marconi

Company has developed a new and powerful (500-watt) aircraft set, known as the Type AD.8. With this set it is possible for aircraft to maintain telegraphic and telephonic communication over very considerable distances, and it fulfils the requirements of a large class of airships, large aeroplanes, and flying boats as adequately as the well-known Marconi AD.6 set—which has been approved by the Air Council for British Civil Aircraft—meets the needs of medium-sized machines. The wave-range of the transmitter is continuously variable between 600 and 1,500 m., while the receiver has a wave-range of 600 to 4,000 m. Power may be supplied from a wind-driven generator operated by a constant-speed propeller or by a small petrol engine, according to the users' requirements.

In combination with a direction-finder the Marconi Type AD.8 equipment represents the last word in modern wireless practice in connection with aircraft, both for civil and service operations.

Experience with aircraft direction-finders, similar to that which did such excellent service on the Franco flight to South America, and arranged particularly for use on all-metal flying boats where only small loops, with an inferior pick-up, are available, place the Marconi Company in the unique position of being able to quote for the fitting of all-metal aircraft with wireless direction-finders.

Marconi apparatus is being installed on all the machines to be used on the new air route to Egypt and India, which is being opened by Imperial Airways at the beginning of next year; and, since a chain of Marconi aerodrome ground stations is being established by the Air Ministry and the various Governments concerned at frequent intervals throughout the route, the machines will never be out of calling distance of a wireless station.

For aerodrome wireless services, the most up-to-date features of design are embodied in the new stations which will be erected by the Marconi Company for the Air Ministry at Croydon Aerodrome in the near future.

PALMER TYRE Ltd.

SPECIAL TYRES AND WHEELS FOR AIRCRAFT

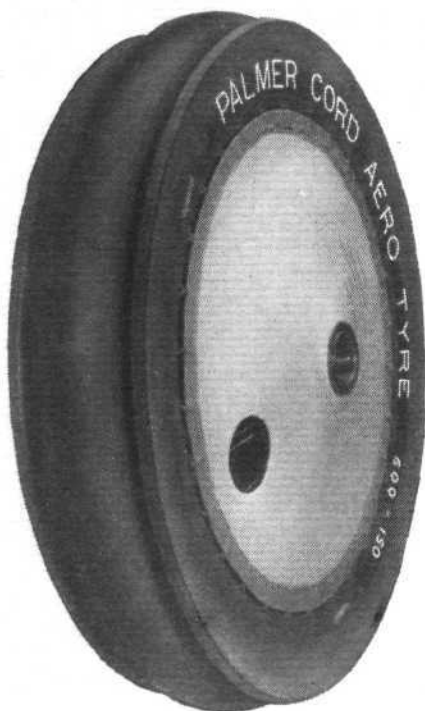
In the early days of aviation most of the aeroplanes were provided with bicycle, or small-size motor-car, tyres and wheels for the landing chassis, and this state of affairs obtained over a considerable period—in spite of the obvious disadvantages of such a practice, one, the bicycle wheel and tyre, being much too weak, and the other too heavy.

It was not, in fact, until about 1913 that the problem of the provision of suitable tyres and wheels for use on aircraft was seriously tackled by the Palmer Tyre firm. So many accidents had been caused—and so many machines thereby put out of action—by landing wheel failures, that the R.F.C. (as it then was) decided it was high time that something more suitable for the job be found. Inquiries were sent out to various tyre makers, and as a result the research and experimental department of the Palmer Tyre, Ltd., realising that what was required was something quite different from what wheel and tyre makers had previously produced, approached the Royal Aircraft Factory with a view to

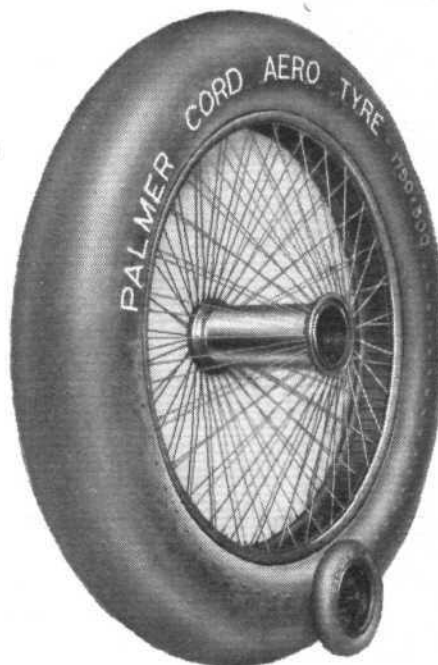
used in cycles and motor-cars, fitted originally to aircraft, the principal trouble experienced was that when landing in a side wind, the lateral stress set up in the tyre caused the "toe" of the tyre bead to lift, which allowed the inner tube to blow underneath and burst, or else the tyre was pulled bodily off the rim.

In Palmer aero tyres a rim of special design is employed, the beads of the cover being so constructed that they are locked in the rim, and are thus rendered capable of withstanding a very great lateral stress without either pulling out of the rim or "lifting" at the toe of the bead. The famous Palmer cord fabric, one of the strongest flexible materials known, enabled a tyre being employed, which, strength for strength, is much lighter than any that can be made from other material.

Several other factors have presented themselves in the evolution of the present-day Palmer aero tyres and rims. One, which the Palmer Tyre, Ltd., has given considerable attention with particularly satisfactory results, is the pro-



The Palmer Aero Wheel, with broad tread tyre, specially designed to facilitate landing on soft ground.



Two of the range of twenty sizes of Palmer Aero Wheels and Tyres.

obtaining exact data regarding the requirements of aircraft landing gears, their weak points, etc.

Having received the necessary information, the Palmer Tyre, Ltd., set to work designing and constructing an entirely new type of aero-wheel and tyre—together with the necessary plant for same—and within six months the first pair of wheels specially designed for aircraft were produced and submitted to the Royal Aircraft Factory for test. Of course, the famous Palmer Cord tyres were fitted to these wheels.

These experimental wheels were subjected to very severe practical test, with such satisfactory results that later in the same year a small contract was placed. Further experiments were carried out, and early in 1914 Palmer Aero landing wheels and tyres, the forerunners of the present-day models in extensive use throughout the world, were available in small sizes suitable for machines then in service. From this small, but well thought out beginning grew the comprehensive Palmer organisation, which provided practically every fighting and bombing aeroplane produced in this country during 1914-18.

That these wheels and tyres were evolved on correct principles is demonstrated by the fact that, apart from several minor improvements that have been effected from time to time, the present Palmer aero wheel and tyre is still fundamentally the same.

One of the special requirements in the design of Palmer aero wheels was that they should be able to withstand very severe lateral stresses. With ordinary beaded-edge tyres as

vision of wheel shields, or side covers. It is obvious, of course, that unless the sides of a wire-spoked wheel are enclosed in some way, the head resistance at high speed will be considerable. In order to reduce this head resistance, and provide some approach to streamline form, Palmer aeroplane landing wheels are, therefore, usually fitted with these shields.

A special and unique feature of the Palmer shield is its attachment by means of wire hooks having a compensating action, which ensure the shields being constantly taut under varying atmospheric conditions, and, after being doped or painted with preparations calculated to produce a certain degree of shrinkage. Furthermore, the Palmer detachable shield can easily be removed, for examination purposes, without disturbing the inflated tyre.

There are two types of these wheel shields, one for attachment to the rim of the wheel and the other for attachment to the side wall of the tyre at about the point of maximum cross section. The latter type, known as "full stream line," is used on high-speed aeroplanes, whilst with certain designs of under-carriages both types of shield are used in combination—rim attachment on the inner side and full stream-line on the outer side.

The Palmer Tyre, Ltd., have also effected considerable improvement in aero landing wheels as regards the wheel rims themselves. These are, of course, essentially different in section from those employed for motor-car tyres, and are of the double channel type, ensuring maximum strength for load carrying, combined with immense lateral stability and minimum weight.

BRITISH INSTRUMENT Co., Ltd.

THE SAVAGE-BRAMSON ANTI-STALL GEAR

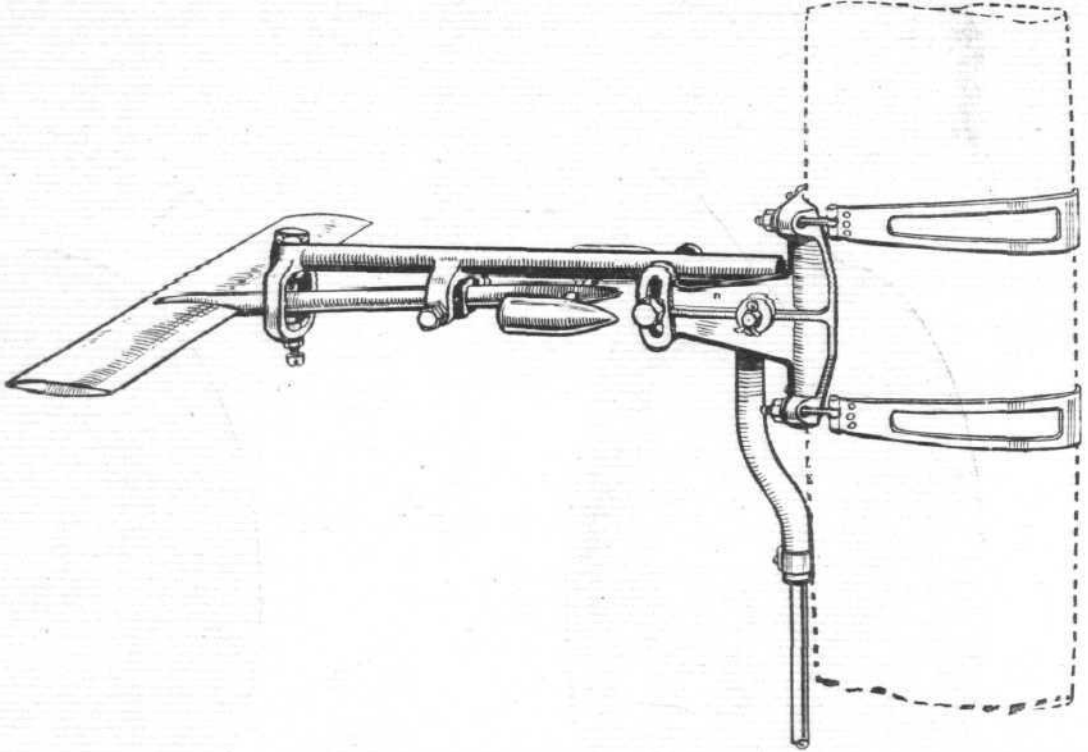
As a result of crashes in 1926, seventy-eight deaths occurred in the Royal Air Force, and two hundred and thirty aeroplanes were written off charge. These figures were given in Parliament by the Secretary of State for Air on November 22, of this year.

It is a fact well known to everyone actively connected with flying that the exceedingly high percentage of such crashes,

forward warning force to the joy stick. This force, is equivalent to about 10 to 15 lbs. at the pilot's hand, and should he wish to stall the machine, in spite of the warning, all he needs to do is to increase his pull on the stick by 10 or 15 lb.

It is, however, *physically impossible* for him suddenly to apply that extra pull *without knowing that he is doing so*. It is clear, therefore, that the warning is of such a kind that it

Fig. 1.—The Stall Detector, shown here, is an unstable vane facing the air stream, free to move through an angle of about 70 degs.



officially ascribed to "an error of judgment on the part of the pilot," are, with very few exceptions, really caused by accidental stalls.

It is needless here to enter into any lengthy argument as to whether that official expression is either accurate or just to the pilot. Suffice it here to remark that in most such cases the pilot has had no opportunity of exercising his judgment in the matter, having been given no indication whatever that a stall was imminent and having had all his faculties concentrated on some urgent or difficult task such as, for instance, bringing off a forced landing or finding his way in a fog.

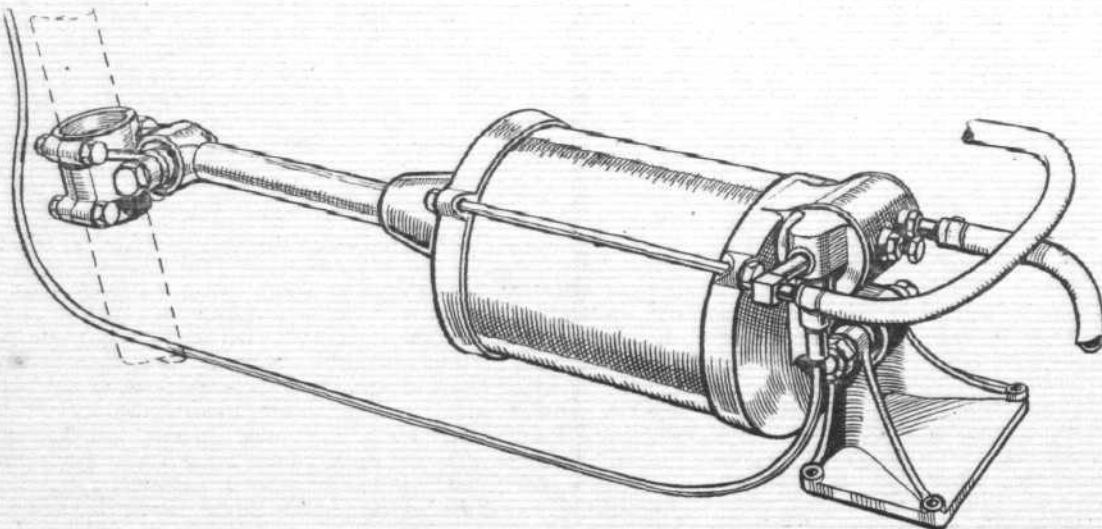
No aeroplane fitted with the Savage-Bramson Anti-Stall Gear, which is illustrated here, can stall accidentally. Just before the stalling point is reached the gear applies a sudden,

cannot possibly fail to reach him; nor can it possibly be misunderstood.

The construction and operation of the Savage-Bramson Anti-Stall Gear was fully described in FLIGHT of August 13, 1925, but for the benefit of those who did not happen to read or file that description a brief outline of the gear is given below.

Fig. 1 shows the Stall Detector. It is an aerodynamically unstable wind vane held by a bracket which is attached to a front inter-plane strut, or in some other position of minimum turbulence. Being unstable the vane has only two possible positions, namely on one or other of the stops which limit its angular movement. This angular movement is adjustable, and is normally set to about 7° . Normally the vane rests

Fig. 2.—The Warning Unit. This is a cylinder, piston and rod, hinged respectively to some fixed part of the fuselage, and to the joy stick, incorporating a pneumatic relay admitting air pressure to the cylinder when the Detector detects an approaching stall.



on the bottom stop, with the air stream holding it down. When the angle of incidence of the wings is increased to such an extent that the wind just begins to blow on the vane from below it flips up to the top stop and there remains till the angle of the relative wind is reduced by 7° from the angle that moved it over. When on the top stop the detector holds open a small valve which causes the Warning Unit to function.

It is clear that if the vane is set, for instance, at an angle of 14° to the chord of the wings then it will flip up to the top stop when the angle of incidence of the wings is 14° . If the incidence at which the machine stalls is 15° , there will be a margin of 1° , and the machine will be under complete control when the detector operates, *i.e.*, when the warning is given.

Fig. 2 shows the Warning Unit. It consists of a cylinder and piston, about 4 in. diameter, to which air pressure of about 15 lbs. per sq. in. is admitted by a "pianola" relay

operation throughout the spin in either direction. In taking off it operates if the aeroplane is taken off very tail down . . . The device operated correctly on steeply banked turns in either direction.

The Savage-Bramson Anti-Stall gear has the following distinctive features:—

1. It does not wait for the pilot to enquire from any instrument, or otherwise, whether he is safe. It tells him as soon as he is not safe, and it conveys that message to his brain via his sense of touch. It does not even require a rapid reflex on his part to take correct action; on the contrary, it would require a rapid reflex not to do so.
2. In no circumstances can the gear interfere in the slightest with the pilot's absolute control of his machine.
3. As the gear depends for its functioning upon the stalling incidence of the machine, which is a constant for any given machine, the same adjustment will be correct for all load varia-

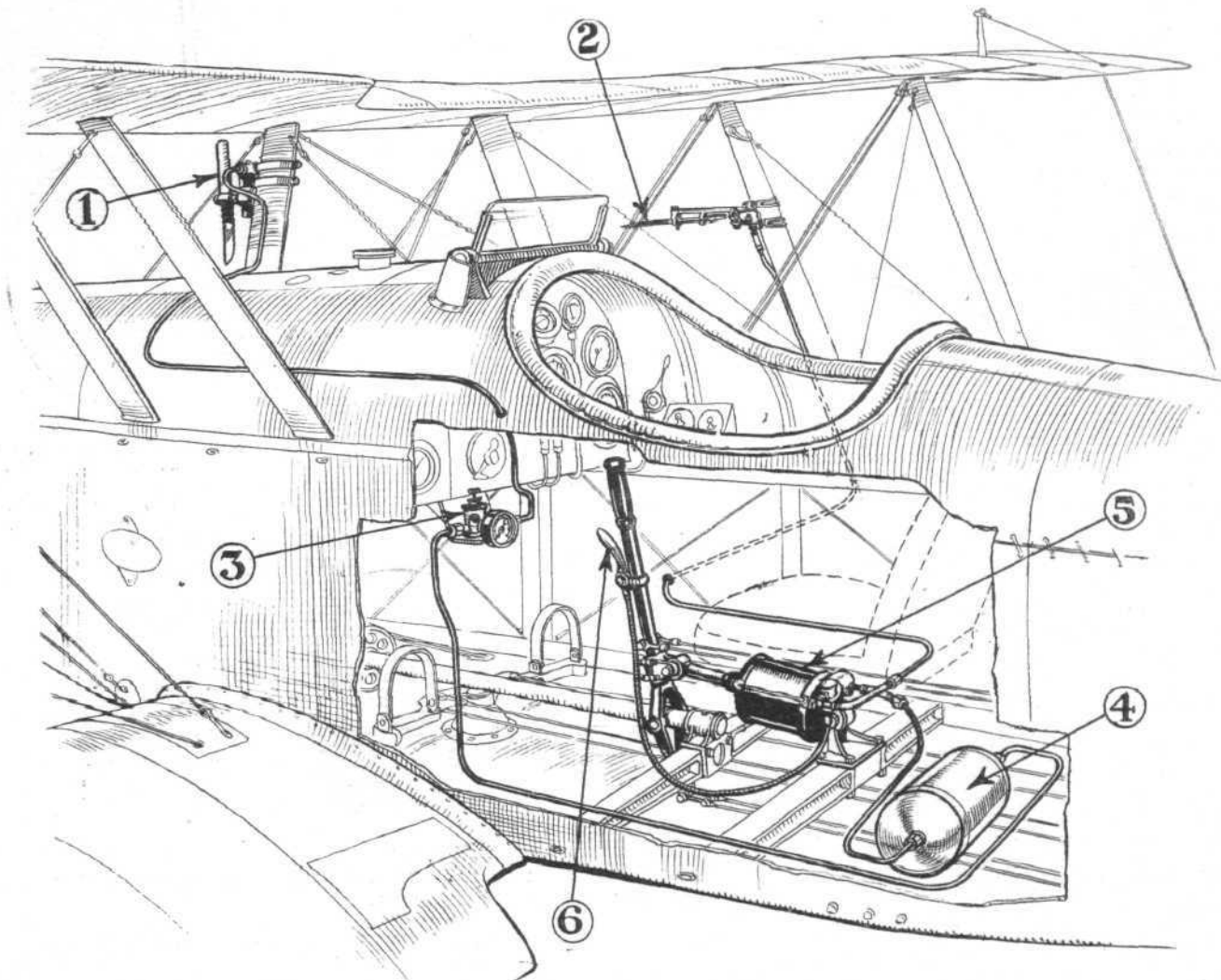


Fig. 3.—The Savage-Bramson Anti-Stall Gear: Installation Diagram. (1) Wind-mill Air Pump; (2) Stall Detector; (3) Pressure Relief Valve and Gauge; (4) Air Reservoir; (5) Warning Unit; (6) Cut-out Control.

valve when the small valve on the Detector is opened. This pressure is maintained as long as the detector valve is open; it is supplied by the windmill pump (shown in Fig. 3) delivering into the air reservoir (also shown). The piston rod is attached to the joy stick through a universal joint, and the cylinder is similarly attached to some fixed part of the fuselage.

The operation of the gear in flight can hardly be more clearly described than by the following extract from a recent official test report:—

"The operation of the device was tested in straight flight and in various manoeuvres, such as loops, steep turns and spins . . . The device operated successfully and the indication given of an imminent stall, *i.e.*, a sharp forward force on the stick, is considered a particularly suitable one . . . It seemed very consistent in action, and the indication was positive and of a very convenient nature. At the same time, the force applied could be easily overcome by the pilot and was not enough to put the nose of the aeroplane down violently. It was, in fact, an effectual warning . . . In a spin the device operated on the preliminary stall and stayed in

tions whether static (passengers, goods, petrol) or dynamic (centrifugal loads in a turn, etc.).

4. The type of warning given is identical with that employed by most flying instructors on dual control machines ("A tap on the Joy Stick").

5. Should a pilot endeavour to take off with the tail of his machine too low the warning will be given even before he has left the ground.

6. The Gear can be installed on any existing aeroplane at a low cost, and involves no structural alteration whatever.

7. The total weight for a medium machine is about 8 lbs.

The Savage-Bramson Anti-Stall gear is patented in all the principal countries. The patents cover not only the principles involved but also all important features of design. It is manufactured by the British Instrument Co., Ltd., of Hendon Aerodrome, London, N.W.9, to whom application should be made for further particulars and demonstrations.

In France the gear is being manufactured under licence by Monsieur A. Odier, the well-known constructor and inventor of the aero-engine starter bearing his name.

"FIRST ON LAND AND FIRST IN THE AIR"

This position has been attained only by years of very

1919. First Atlantic, Sir John Alcock (1,880 miles).

1919. First London-Australia, Sir Ross Smith (13,500 miles).

1920. First London-Cape, Col. van Ryneveld (6,281 miles).

1924. First London-North Africa, Sir Alan Cobham (1,300 miles).

GREAT BRITAIN.

The late Sir John Alcock—first and only direct aeroplane flight across the Atlantic—1,850 miles on 14th and 15th June, 1919.



*Capt. Pelletier D'Oisy
—Paris, Rome, Tunis,
Casablanca, Madrid,
Paris—3,700 miles in
40 hrs. on the 24th
and 25th August, 1926.*

ARGENTINE

Major Pedro Zanni—
Amsterdam to Tokio—
9,000 miles, July to
November, 1925.

ITALY.

*Commandante F. de Pinedo—
Rome to Australia via India,
round Australia to Tokio and
back to Rome—34,000 miles,
April to November, 1925*

HOLLAND.

T. Van der Hoop—
Amsterdam to Batavia
—1,500 kilos, October
1st, 1924.

thorough research into the problems appertaining to hydrocarbon fuels, and to careful and scientific production and blending of the different grades of petrol. In short, Shell-Mex, Ltd., being fortunate in controlling the production of petrol in such diverse areas, they are able to *blend* a petrol that combines all the essential qualities for any particular requirement—i.e., a "well-balanced" fuel.

1924. First England-Japan, Sq.-Ldr. MacLaren (1,300 miles).

1924. First Holland Batavia, Van der Hoop (6,680 miles).

1924. First North Pole Expedition, Capt. Amundsen.

1925. First "Greater than Round the World," Marchese di Pinedo (34,000 miles).

1926. First Spain-South America, Com. Franco (6,260 miles).

In conclusion, it should be mentioned that Shell-Mex, Ltd. have been equally successful with their lubricating oils.

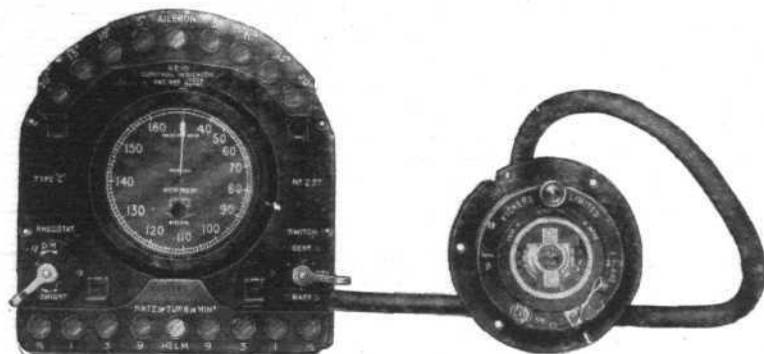
The Union of South Africa Air Mail Service, which operated between Cape Town and Durban last year, filling up with Shell.



VICKERS Limited.

IN such an immense organisation as that of Vickers, Ltd., it is to be expected that, in addition to their wide range of aircraft types, their many factories produce much of special interest to aviation, both from the military and civil points of view. The following notes will indicate, in some slight degree, the wide scope of their manufactures.

FITTINGS FOR THE PETROL, OIL AND WATER SYSTEMS of an aircraft must, of necessity, be as near



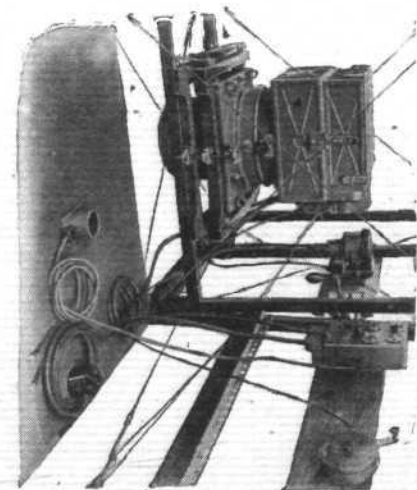
Vickers Reid Indicator.

perfection as can be attained. Vickers have devoted a very great deal of attention to the development of a complete range of such fittings. The new Vickers patent PETROL COCKS are now made almost entirely of Duralumin, the plug being of Vickers Immaculate Steel (Fustless) with bronze seating. These are available in "two-way," "three-way" and "four-way" form, and in sizes from $\frac{1}{8}$ -in. B.S.P. to 1 in. B.S.P. A $\frac{1}{2}$ -in. two-way Cock weighs 5 ozs. only. Other fittings include Oil and Water Drain Cocks, Petrol Non-Return Valves, Flow Indicators, Relief Valves, Oil Relief Valves, Water Flushing Valves, Petrol Filters, Centrifugal Petrol Pumps (wind driven), the Mark II* (3-in. impeller), and the Mark VI (2-in. impeller), etc.

The VICKERS (patent) OLEO PNEUMATIC UNITS for UNDERCARRIAGES AND TAIL SKIDS are now standard components of all their aircraft types. This system of suspension has been brought to a state of perfection after very extensive experiments. It employs compressed air as the resilient medium in the place of the somewhat perishable rubber-cord shock absorber used in the past. They are equally efficient for two-wheeled or for four-wheeled chassis, and are made in five standard sizes which cover most existing types of aircraft. Special units can be designed for extraordinary requirements. It is interesting to note that many aircraft

constructors abroad, in France, Germany and in the United States, are embodying the Vickers Oleo Unit in their suspension systems.

Other aero specialties include STREAM-LINED WIRES and SWAGED TIE-RODS, TUBING of SPECIAL AIRCRAFT STEELS (made at Sheffield), METAL COUPLINGS for petrol pipes. Adjustable PIPE CLIPS ("Malleville" patents), and the Vickers patent UNIVERSAL PULLEY AND GUARD, for bomb gear and for other light duties. The Pul-



Vickers Eagle Camera.

ley Unit, which is of Duralumin, can be supplied to contain from one to twelve pulleys with a single steel fixing bolt.

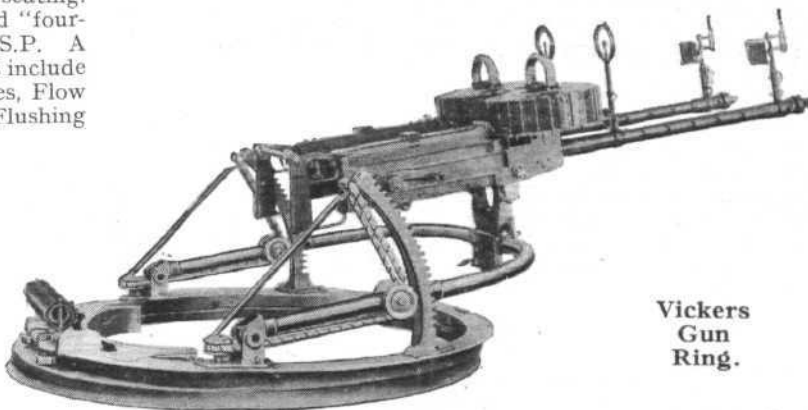
Passing to items of separate equipment, a most interesting instrument is the REID CONTROL INDICATOR, which

gives to the pilot an immediate indication of any departure from his set course. The Reid Control Indicator, it may be mentioned, is part of the present standard equipment of every aircraft operated by Imperial Airways, Ltd., and its great value has recently been specially commented upon in an official report of two officers of the Danish Military Flying Corps who, respectively, flew from Copenhagen via Calcutta, Rangoon and China to Yokohama and back to Copenhagen via Siberia and from Copenhagen to Rangoon and back to Copenhagen.

The VICKERS-DAVIS NAVIGATION LIGHTS (Light Pattern), produced from the Weybridge factory, are considerably lighter than the standard "Davis" Navigation Lights of which Vickers also possess the commercial rights, and which are standard equipment for Royal Air Force machines. They are designed to meet all the requirements for Identification Lamps for night-flying aircraft, as laid down by the International Convention of 1919. They include patented Bracket Mountings and a patented dual filament electric lamp. The full set covers Port and Starboard lights Head and Tail Lamps, and, for Seaplanes, Anchor Light and Out-of-Control Lights. Vickers also manufacture ELECTRIC GENERATING EQUIPMENT for aircraft lighting and heating systems, SANITARY EQUIPMENT for passenger-carrying aircraft, and ADJUSTABLE SEATS FOR PILOT

AND NAVIGATOR which can be raised or lowered during flight.

The "EAGLE" AUTOMATIC ELECTRIC AIR CAMERA, of which a full description was given in the issue of FLIGHT



Vickers Gun Ring.

dated November 11, 1926, is of the greatest interest to all concerned in air photography, either from the point of view of the civil surveyor or from the military reconnaissance aspect. This camera is manufactured by the patentees, Messrs. Williamson Manufacturing Co., Ltd., of Willesden Green, N.W., for whom Vickers, Ltd., are sole selling agents.

Another camera, but for an entirely different duty, is the "HYTHE Mk. III" GUN CAMERA (the product of Thornton Pickard Manufacturing Co., Ltd., of Altrincham), for training in air gunnery, recording, on a film, the results of the pupils' shots.

Vickers also supply the standard Air Force gunnery training apparatus known as the "ROCKING FUSELAGE," the "FIXED INSTRUCTIONAL FUSELAGE," the $\frac{1}{4}$ TH SCALE DEFLECTION TARGET" (for use on the 25 yards range), and the "AERIAL GROUND TARGETS."

As regards Armament, with which the name of Vickers, essentially, is associated, space does not permit a description of the many items which come under this heading, but mention should be made of the VICKERS RIFLE CALIBRE AIRCRAFT GUNS, Belt Feed and Drum Feed, the VICKERS 5-IN. AUTOMATIC GUN (all manufactured at the Erith factory), and the range of AIRCRAFT BOMBS, of 20 lb., 50 lb., 112 lb., 230 lb., 520 lb., and 550 lb. types) made and filled at the Dartford Works where also are produced CARRIERS for all these Bombs, and the VICKERS-SCARFF WIND BALANCED AIRCRAFT GUN MOUNTING, which is a development of the well-known "Scarff Ring" used during and since the Great War in almost every Air Force in the world.

Vickers Dartford factory also produced a comprehensive range of PYROTECHNIC SIGNALS and apparatus for their discharge.

CIERVA AUTOGIRO Co., Ltd.

By CAPT. F. T. COURTNEY

THE Cierva Autogiro Company was formed early this year to develop the now well-known invention of Señor de la Cierva, the Spanish engineer.

The object of this invention was to eliminate the principal defects and dangers of the ordinary aeroplane. The great

a complete revolution in flying. A further defect with the ordinary aeroplane is the lack of natural stability and the consequent difficulty and complication of controls.

In various demonstrations in Spain, England, France and Germany the experimental autogiro machine has demonstrated that it overcomes, beyond any question, these main defects of the heavier-than-air aircraft.

The work of the Cierva Autogiro Company has, in effect, been divided into two parts. The first was to prove publicly beyond all question that the autogiro, as a principle, performed all that was claimed for it.

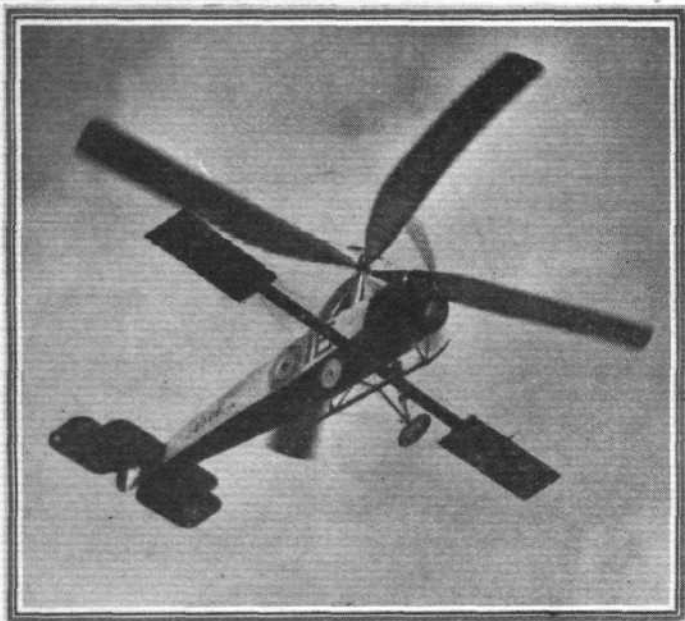
The second part of the company's work was to proceed with the developments necessary to apply these principles to more practical flying machines, for it must be emphasised that the autogiros which have, so far, been flying in public were merely primitive apparatus to demonstrate the principle.

The first part of this work has been accomplished more than satisfactorily, and it is generally recognised throughout the aeronautical world that this invention represents the most important event in flying since the Wright Brothers first flew.

The company is now, therefore, engaged in carrying out an extensive series of experiments on the aerodynamical and mechanical problems which the new feature of this system present. Apart from machines being built by or for different governments, the company is constructing several experimental machines of its own. A great deal of information has already been collected and on completion of the experiments now being made it will be possible to give much more definite data for the construction of machines, of all classes, which will be able :—

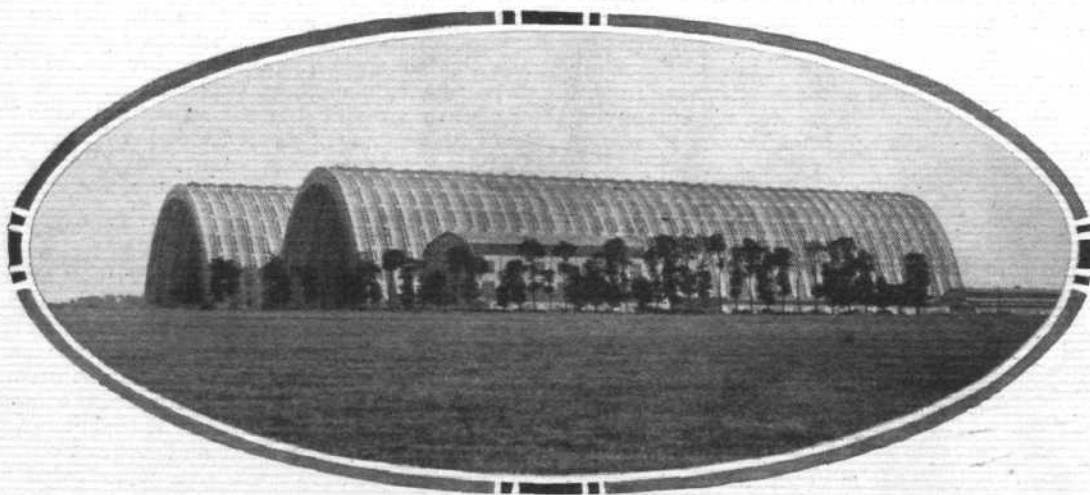
1. To take-off and land with little or no run.
2. To be incapable of stalling or getting out of control.
3. Extremely easy to fly and handle.
4. Simple and easy to construct.

The information on which these experiments are based is, to a large extent, complete; so that it will be only a very short time before a greatly perfected series of aircraft will be able to be built on this system.



The Experimental Autogiro (Avro) in flight.

majority of aeroplane accidents are due to what is known as "stalling." When an aeroplane stalls it loses, practically speaking, all its supporting power and its control. Moreover, this characteristic of stalling and its results lead to the necessity for such skill in flying and such large spaces for landing and take-off, that the elimination of stalling can be said to be



latter there is first a 480 h.p. direct-drive engine; behind that a 700 h.p. direct-drive, and at the back a 300 h.p. engine. Then comes a 700 h.p. geared engine and a 550 h.p. geared. A 550 h.p. direct-drive engine follows, and a 500 h.p. geared and a 450 h.p. direct-drive complete the exhibit. A large photograph shows the actual 420 h.p. engine which won the great engine competition, completing 240 hours' running in 30 runs of 8 hours each.

It is quite impossible for us to afford the space to give details of this impressive series of engines, and we must confine ourselves to giving brief data relating to the new series of light Renault engines which have been developed from the 420 h.p. model that won the million francs competition. The lighter engines are stated by the makers to be a result of an intense study of component parts, which has enabled these to be lightened without sacrifice in strength and rigidity, and made higher speeds possible with the same reliability as that possessed by the older types.

It is pointed out that the crankcase, camshaft case, etc., have been lightened, the lubrication is on the dry sump principle, various accessories are now grouped at the back of the engine thus giving shorter drives, the crankshaft has been strengthened by making it of larger diameter, although it is lighter than the old one. Detail improvements such as these have enabled a great saving in weight to be accomplished. How great this saving is, since Renault first started making aero engines in 1909 or so, will be seen when it is pointed out that whereas the first 50 h.p. Renault engine weighed 2.5 kg/h.p., the latest high power models weigh but 0.75 to 0.87 kg/h.p.

All the models of which data are given below are of the 12-cyl. water-cooled Vee 60° type, and can be supplied either with direct drive or with reduction gear.

The 450 h.p. 12 Ja direct drive engine has a bore of 125 cm. and a stroke of 170 mm. The compression ratio is 5.6 to 1, and the normal speed 1,800 r.p.m. The nominal power is 450 h.p., and the actual power 470 h.p. The weight is 350 kg.; the petrol consumption 220 gr./h.p./h, and the oil consumption 15 gr./h.p./h.

The 500 h.p. type 12 Jb., which is the geared version of the 12 Ja, has the same bore and stroke and the same compression ratio, but runs normally at 2,000 r.p.m. It is rated at 500 h.p. and delivers 510 h.p. The petrol and oil consumptions are the same as those of the direct drive model and the weight is 380 kg.

The 550 h.p. type 12 Kg, is a direct drive engine similar to the 12 Ja, but is a slightly larger engine, the bore being 134 mm. and the stroke 180 mm. The compression ratio is 5.6 to 1,

and the normal speed 1,800 r.p.m. The nominal power is 550 h.p., and the actual 565 h.p. The petrol and oil consumptions are the same as in the smaller engines. The weight is 460 kg.

The 600-h.p. type 12 Kh is the geared version of the 12 Kg, and has the same bore and stroke and compression ratio. Its normal speed is, however, 2,000 r.p.m. and the nominal power 600 h.p., while the actual power is 615 h.p. The consumption is as before, and the weight of the engine is 495 kg.

The 700 h.p. type 12 Mc direct drive engine has the following characteristics: Bore 160 mm.; stroke 180 mm. Compression ratio 5.0 to 1. Normal speed 1,700 r.p.m. Nominal power 700 h.p. Actual power 720 h.p. Petrol consumption 225 gr./h.p./h. Oil consumption 15 gr./h.p./h. Weight 620 kg.

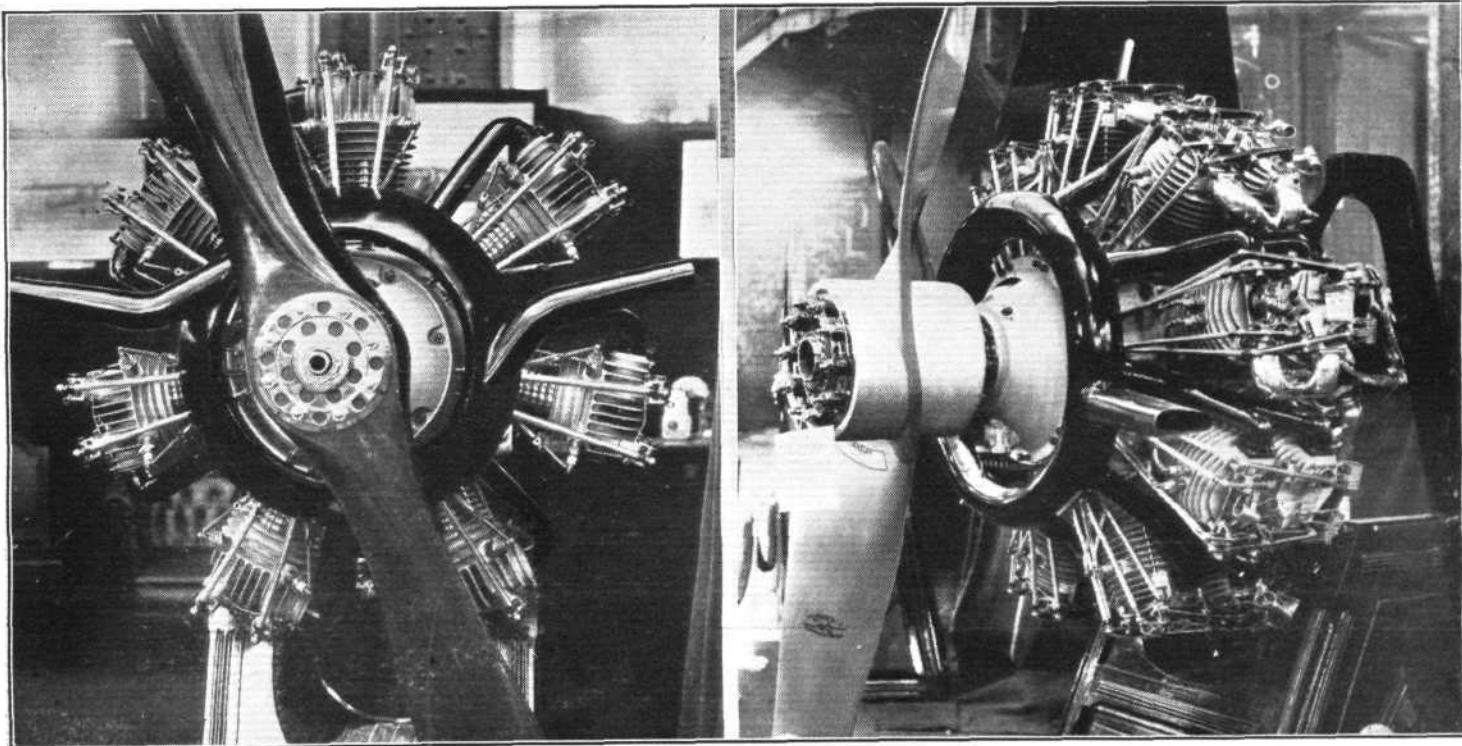
The 700 h.p. type 12 Md is the geared version of the 12 Mc, and has the same bore, stroke and compression ratio. It runs normally at 1,800 r.p.m. and is rated at 700 h.p., actual, developing 740 h.p. The petrol and oil consumptions are the same as those of the direct drive model, and the weight is 675 kg.

The 12 Jb and the 12 Kh engines can be supplied with two reduction gears, one having ratio of 2 to 1 and the other a ratio of 2 to 1.33. For the type 12 Md, i.e., the largest engine, the two ratios are 2 to 1 and 3 to 2 respectively.

THE SALMSON ENGINES

A FIRM which has specialised on the production of radia aero engines for a great number of years is the *Societe des Moteurs Salmson*, and at this year's Salon the firm has remained true to its traditions in that it exhibits nothing but radial engines, of which seven distinct types are shown, some few of which are water-cooled, but the majority of which are air-cooled. The series of engines shown range from 40 h.p. to 500 h.p., and two of the types exhibited are quite new, one being a 7-cylindered radial air-cooled, and the other an 18-cylindered air-cooled. It will be remembered that, in addition to the engines shown, the firm produces some radials of very low power, i.e., from 12 h.p. upwards, so that one may take the complete range as beginning at this low figure. Thus the firm may justly claim to have "something for every taste."

The *Salmson A.D.9* is the little 40 h.p. 9-cylinder radial air-cooled engine, fitted, among other types, on the Albert monoplane on which Lieut. Thoret has made some famous long-distance flights. With its comparatively great number of cylinders for the power developed, this engine runs remarkably smoothly, and when flying overhead sounds



ENGINES AT THE PARIS SHOW: Two Salmson air-cooled radials, on the left, the 7-cylinder 95 h.p., and, on the right, the 18-cylinder 460 h.p.

more like a rotary, with its wasp-like buzz instead of the more staccato notes of the majority of radials. It has a bore of 70 mm. and a stroke of 86 mm., and develops 40 h.p. at a speed of 2,000 r.p.m. The weight is 75 kgs.

The A.C. 7-95 h.p. engine is next on the list, taking the engines in the order of power developed. This is one of the two new models produced for this year's Paris Salon, and is a 7-cylinder radial air-cooled, with a bore of 100 mm. and a stroke of 130 mm. It develops 95 h.p. at 1,800 r.p.m., and weighs 130 kgs.

The A.C. 9-120 h.p. engine has the same cylinders, pistons, etc., as the A.C. 7, so that the spare parts that have to be kept are identical. The only difference between the two types is that the larger engine has 9 cylinders and the smaller 7. The characteristics of the 120 h.p. type are: Bore, 100 mm.; stroke, 130 mm.; power, 120 h.p. at 1,800 r.p.m.; weight, 170 kgs.

The A.B. 9-230 h.p. is similar in type to the other engines, i.e., is a 9-cylinder radial air-cooled, but the bore and stroke have been increased to 125 mm. and 170 mm. respectively. This engine develops 230 h.p. at 1,700 r.p.m., and weighs 240 kgs.

The A.B. 18-460 h.p. has the same bore and stroke as the A.B. 9, but has 18 cylinders arranged in two rows of nine each, and a special feature of this engine—which is the second of the two new models to be shown—is that the front and rear cylinders are placed one directly behind the other, instead of being staggered as is more usually the case. The precise reason for this arrangement we have not been able to ascertain. It would appear that the rear cylinders might tend to be somewhat inadequately cooled, although we understand that the manufacturers claim that perfectly even cooling is obtained owing, probably, to the somewhat disturbed flow of the air in the slip-stream from the propeller, which strikes the cylinders diagonally rather than in a direct fore-and-aft direction. The placing of the cylinders behind one another, with the push rods situated in front, has necessitated some rather unusually long rocker arms for the operation of the valves of the rear cylinders. Incidentally, it might be mentioned in this connection that there are only two valves per cylinder. The A.B. 18 has a bore of 125 mm. and a stroke of 170 mm., develops 460 h.p. at 1,700 r.p.m., and weighs 490 kgs.

This completes the list of air-cooled engines shown on the Salmson stand. The two remaining engines are of the radial water-cooled type.

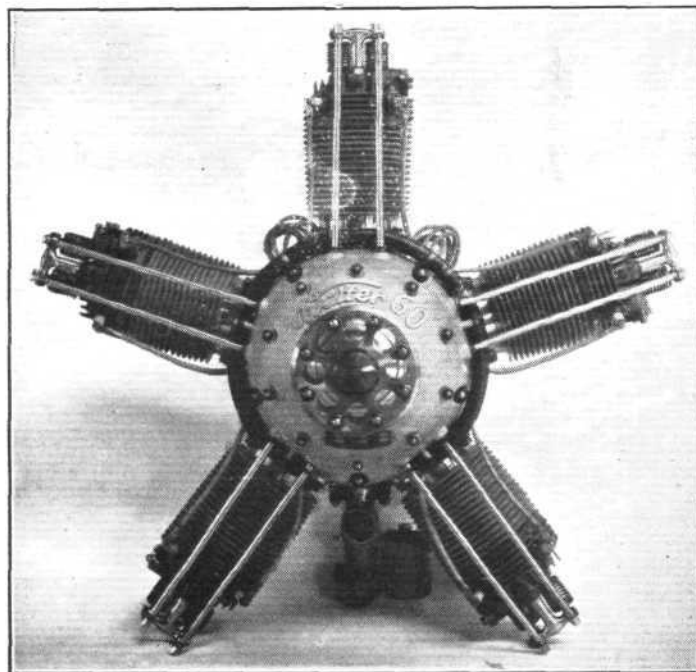
The C.M. 9-260 h.p. engine has a bore of 125 mm. and a stroke of 170 mm., develops 260 h.p. at 1,650 r.p.m., and weighs 250 kgs.

The C.M. 18-500 h.p. has its 18 cylinders arranged in two rows of nine each, the cylinders being behind one another as in the 18-cylinder air-cooled, but, of course, water-jacketed.

A placard on the stand announces that this engine has been used extensively on commercial machines, and has also been fitted on the Breguet XIX A.2, Potez XXV A.2, and Caudron 107 G.R., as well as on Hanriot and Bechereau machines. An engine of this type completed 150 hours' running in 15 runs of 10 hours each without changing a single part, or even a single accessory.

THE WALTER ENGINES

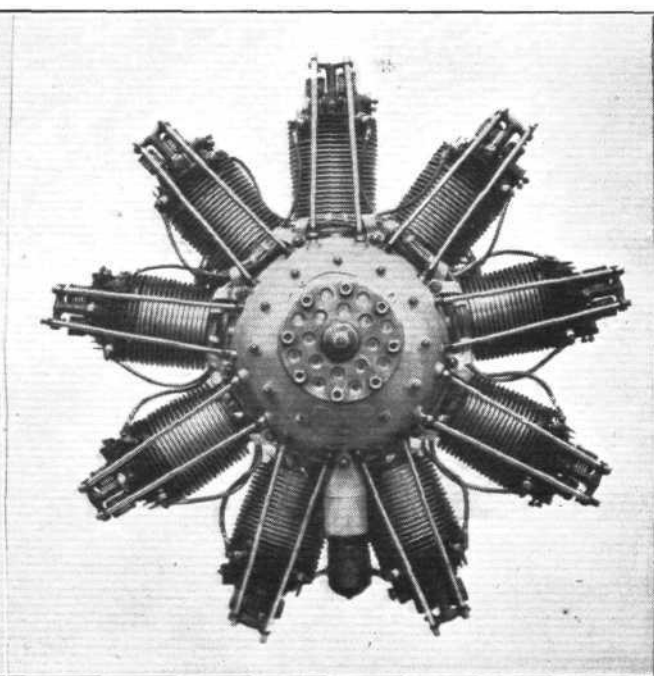
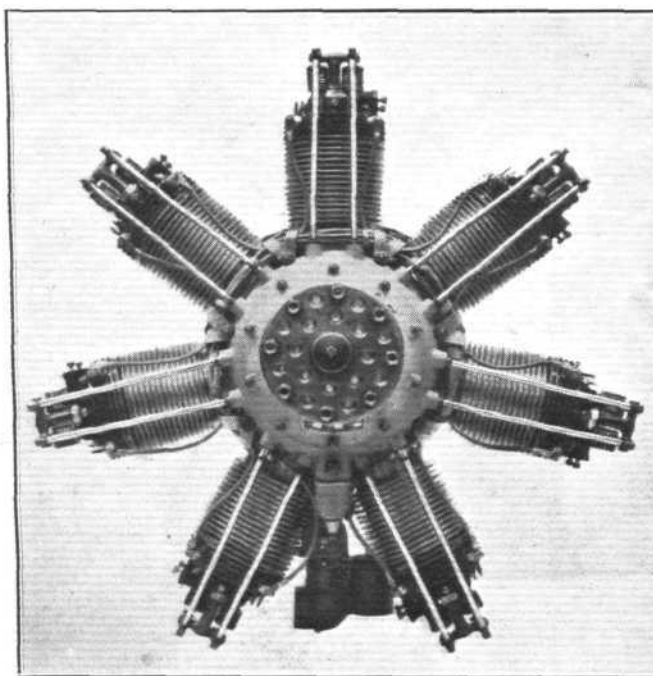
THE J. Walter A. Spol Co., of Prague, exhibits three types of engine, all radial air-cooled, ranging in power from 60 h.p.



ENGINES AT THE PARIS SHOW: The 60 h.p. Walter.

to 110 h.p. All three engines have the same bore and stroke, the same cylinders, pistons, etc., so as to reduce cost of manufacture, and the number of spare parts to be stocked by users of the three types.

Specification of the "Walter 60": 5 cylinders; bore,



CZECH ENGINES AT THE PARIS SHOW: Two Walter radials, on the left the 85 h.p. and, right, the 110 h.p.

105 mm.; stroke, 120 mm.; cubic capacity, 5.3 litres; normal power, 60 h.p. at 1,400 r.p.m.; maximum power, 70 h.p. at 1,600 r.p.m.; petrol consumption, 235 gr./h.p./hr.; oil consumption, 16 gr./h.p./hr.; weight, 102 kgs.

Specification of "Walter 85": 7 cylinders; bore, 105 mm.; stroke, 120 mm.; cubic capacity, 7.4 litres; normal power, 85 h.p. at 1,400 r.p.m.; maximum power, 90 h.p. at 1,460

r.p.m.; petrol consumption, 235 gr./h.p./hr.; oil consumption, 16 gr./h.p./hr.; weight, 128 kgs.

Specification of "Walter 110": 9 cylinders; bore, 105 mm.; stroke, 120 mm.; cubic capacity, 9.5 litres; normal power, 110 h.p. at 1,450 r.p.m.; maximum power, 120 h.p. at 1,600 r.p.m.; petrol consumption, 235 gr./h.p./hr.; oil consumption, 16 gr./h.p./hr.; weight of engine, 152 kgs.



Married

EDWARD GEOFFREY ROSLING, late R.A.F., son of Mr. Percy Rosling, of Shortlands, Kent, was married, on November 18, in London, to GENESTA VICTORIA ALEXANDER, youngest daughter of the late Capt. Ranald Alexander (Black Watch) and Mrs. Alexander, of Ryde, Isle of Wight, and granddaughter of the late Gen. Sir James Alexander, C.B., of Westerton, N.B.

FLIGHT-LIEUT. JOHN STANLEY CHICK, M.C., A.F.C., of Whitchurch, Cardiff, was married on November 25, at St. John's Church, Felixstowe, to FLORENCE DOREEN CHARRINGTON.

To be Married

The marriage arranged between JAMES ALEXANDER GORDON HASLAM, M.C., D.F.C., Flight Lieutenant R.A.F., son of the late Mr. and Mrs. John Bailey Haslam, and HELEN KINNEAR, eldest daughter of the late Mr. W. M. CUTHBERT, of Cape Town, S. Africa, and of Lady SEYMOUR-LLOYD, and step-daughter of Sir John Seymour-Lloyd, K.C., of Headley Grove, Headley, Surrey, will take place at St. Mary's Church, Headley, on December 15, at half-past two o'clock.

The marriage of HAROLD AUBREY PEARSON, M.C., D.F.C., eldest son of the Rev. E. Omar and Mrs. Pearson, 6, Belmont Road, Guernsey, to IRENE MAY, eldest daughter of Mrs. M.

TESTER, of St. Leonards, will take place at Shanghai on January 10, 1927.

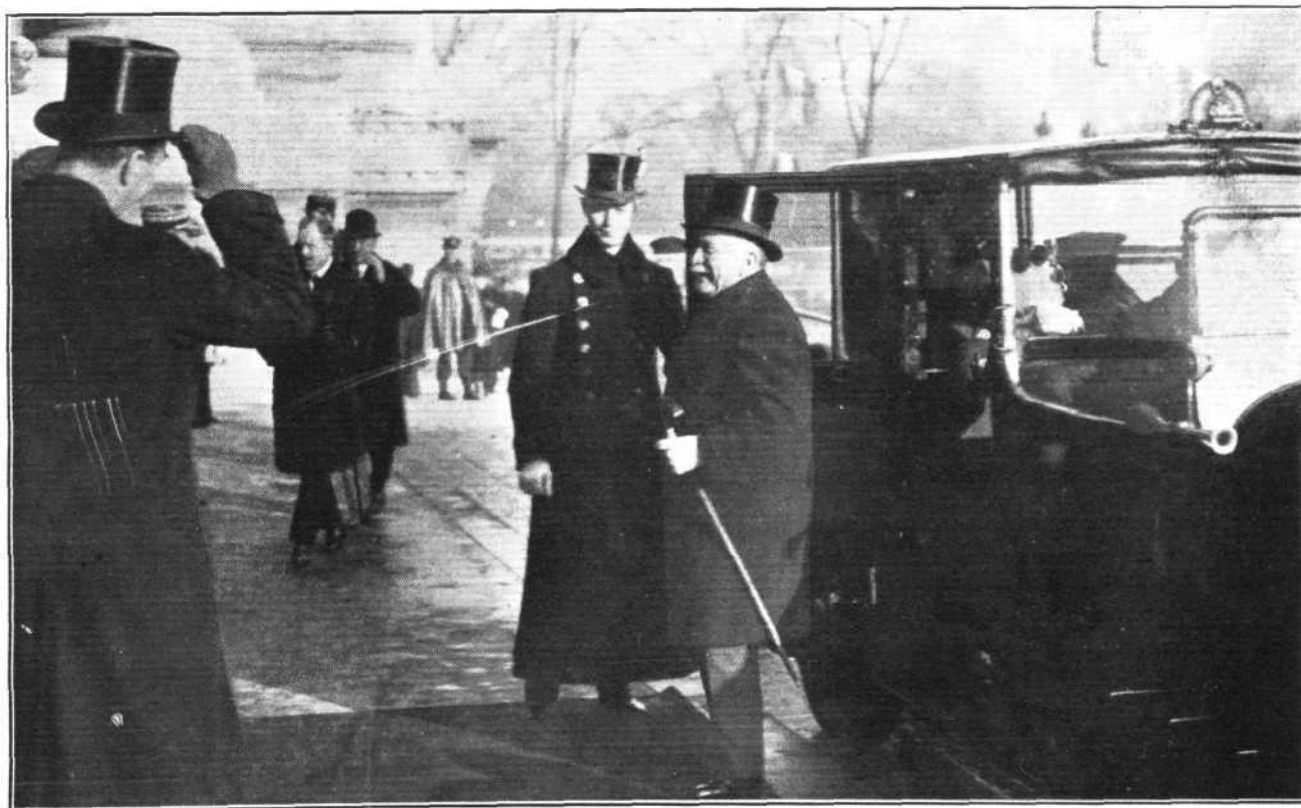
The engagement is announced between FLIGHT-LIEUT. HUGH WALMSLEY, M.C., D.F.C., third son of Mr. and Mrs. James Walmsley, Bexhill, and AUDREY, third daughter of the late Dr. J. H. Pim and of Mrs. Pim, Sleaford, Lincolnshire.

The engagement is announced between Mr. L. DE VILLE CHISMAN, Flying Officer, R.A.F., son of Engineer Rear-Admiral and Mrs. Chisman, of Brockenhurst, and ROSAMUND, daughter of LIEUT.-COMMANDER HARRIS, O.B.E., R.N.R., and Mrs. Harris, of Lymington.

The engagement is announced between A. C. MEREDITH, Flying Officer, R.A.F., son of Mrs. C. Meredith and the late Mr. J. Meredith, of Nottingham, and MARJORIE, the eldest daughter of Engineer-Capt. F. G. HADDY, M.V.O., R.N., of H.M.S. *Fisgard*, and Mrs. Haddy, of Southsea.

Death

Squadron-Leader ARTHUR BRACY LANGRIDGE, R.A.F., of St. Andrew's Vicarage, Uxbridge, whose death occurred on November 12, was the second son of the late Henry Langridge, of 54, Victoria Street, London, and Chillies, Buxted, Sussex.



"FLIGHT" Photograph

AT THE PARIS AERO SALON: M. Doumergue, the French President, arriving at the Grand Palais on Saturday.

LIGHT 'PLANE CLUB DOINGS

London Aeroplane Club

The total flying time for the week ending December 5 was 17 hrs. 5 mins. The following members were given flying instruction:—H. M. Samuelson, Miss Fletcher, E. J. B. King, H. Spooner, W. L. McCleod, D. P. H. Esler, G. C. Bonner, J. A. Simson, A. J. Richardson, J. J. Hofer, M. P. Susman, Miss O'Brien, Lady Bailey, H. Richardson, E. A. Lingard, R. Malcolm.

The following members made solo flights:—O. J. Tapper, C. E. Murrell, G. Terrell, A. R. Ogston, S. O. Bradshaw, W. L. McCleod, N. Jones, D. P. H. Esler, E. S. Brough, N. J. Hulbert, W. Hay, H. Spooner.

The following were given joy rides:—N. H. M. Watkins, B. Waugh, Mrs. Skinner, Miss Spooner, E. S. Brough, Col. O'Meara, Mrs. O'Meara, S. O. Bradshaw.

The late J. S. M. Michie.—In deference to the wishes expressed by a large number of the members, it has been decided to raise a fund for the purpose of erecting a stone over the grave of the late J. S. M. Michie at Kingsbury Church. Members wishing to subscribe are requested to hand their donations to Capt. F. G. M. Sparks at Stag Lane Aerodrome, or send them to the Secretary, at 3, Clifford Street, London, W.1. Donations are limited to 10s.

Christmas Holidays.—The club will be closed down during the Christmas Holidays, from Thursday, December 23, to Thursday, December 30, 1926.

The total flying for the month of November was 71 hours 45 mins. made up as follows:—

	Flights.	Members.	hrs.	mins.
"A" Licence Soloists	2	20	18	15
Dual Instruction	83	37	36	30
Joy Rides	24	22	9	25
Practice soloists	2	2	0	30
Tests	43	—	7	5
Total			71	45

S. L. F. St. Barbe is continuing to make satisfactory progress. During his absence the de Havilland Aircraft Company, Ltd., are kindly allowing their Pilot Instructors, A. S. White, Capt. C. D. Barnard, and R. W. Reeve to assist the club.

The inspection of the club by the Air Ministry Committee under the Chairmanship of Air Vice-Marshal Sir Sefton Brancker took place on Wednesday last. The Club was represented by Major R. H. Mayo, Col. the Master of Sempill, Capt. C. B. Wilson, and Wing-Com. T. O'B. Hubbard, Members of the Committee, and H. E. Perrin, Secretary. A full discussion took place in the morning on the various statistics as to running costs, etc., and in the afternoon the Committee visited Stag Lane Aerodrome.

Lancashire Aero Club.

REPORT for week ending December 4.—Total flying time for the week, 13 hrs. 50 mins., made up as follows: Dual with Messrs. Brown and Scholes: Messrs. Costa, 1 hr. 10 min.; Twenlow, 1 hr.; Moore, 45 mins.; Nelson, 40 mins.; Miss Brown, 40 mins.; Messrs. Stern and Blagden, 35 mins.; Miss Emery, 30 mins.; Messrs. Harper and Fray, 25 mins. each; Messrs. Dickinson, Newton, and reads, 30 mins. each; Dobson, 15 mins.; Anderson and Fallon, 10 mins. each. Solo:—Messrs. Costa, 1 hr. 15 min.; Leeming, 25 mins.; Lacayo, Michelson, Twenlow, Blagden, and Cantrell, 20 mins. each. Joyrides:—With Mr. Lacayo, Miss Mitchell, 25 mins.; with Mr. Leeming, Miss Jones, 20 mins.; With Mr. Goodfellow, Mrs. Goodfellow, 10 mins.; Miss Montgomery, 10 mins. Test flights, 55 mins.

Excellent first solos were made during the week by Messrs. Blagden and Twenlow, while in addition, Mr. Costa joined the select ranks of those who aviate on the Renault-Avro.

The correspondent has momentarily run out of printable comments on the weather. He had been relying on our Mr. Brown for a few choice remarks in Spanish, but apparently they don't have this kind of weather in Spain, and there are no Spanish expletives to meet it.

A total of 77 hrs. 20 mins. flying has been wrested out of the November weather, and even this modest total has taken a lot of doing. It will be remembered that two of our members have already pushed off in search of the sun, and have reached Malta, where they are at present detained by (we hope) the hospitality of the inhabitants. Another member, Mr. J-hn F-shw-ck L-m-ng, frenzied by our grey skies, is also pushing off in the near future. Having offered a prize to members of the club for a height contest, he is about to set a good example by seeking out the highest convenient mountain and making a three-point landing on top of same. Presumably he hopes to find the summit bathed in sunshine somewhere above the clouds, and we hope he is right.

Midland Aero Club Ltd.

REPORT for week ending November 27.—The total flying time was 7 hrs. 47 mins.

The following members were given dual instruction:—G. V. Perry, A. M. Glover, S. H. Smith, C. Fellowes.

The following made solo flights:—G. V. Perry, H. J. Willis, A. M. Glover, R. L. Jackson, J. Brinton, W. Swann. Test flights occupied 43 m.

The Austin "Whippet" was flown on several occasions during the week by H. J. Willis and G. V. Perry, the latter making his first flight on this machine on Saturday.

With the Club "Moths" and Austin "Whippet" and the Avros and the D.H. gas of No. 605 Bombing Squadron, A.A.F., in the air, Castle Bromwich presents quite a busy appearance. All of which should help to create the air sense and revive interest in Aviation.

REPORT for week ending Dec. 4.—The total flying time was 9 hrs. 40 mins.

The following members made solo flights:—J. Brinton, H. J. Willis, G. V. Perry, R. L. Jackson, E. J. Brighton.

The following members were given dual instruction:—C. Fellowes, O. L. Richards, S. H. Smith.

On Sunday Mr. J. Brinton made the necessary qualifying tests for his Aviator's Certificate.

On Monday Capt. McDough flew L.W. to Hampton Lucy, in order to give an exhibition of flying over the estate of Sir Henry Fairfax Lucy. Bart., on the occasion of a Meet of the Warwickshire Hounds. Tests occupied 30 mins.

The Hampshire Aeroplane Club

REPORT for week ending December 2:—As reported briefly below, the club held its first Annual Dinner at the South Western Hotel, Southampton, on Thursday, December 2. The event was a great success, and a very enjoyable evening was concluded by a humorous debate which was opened by Mr. A. V. Roe placing before the gathering a motion "That Flying Should be Abolished." This motion was opposed by Captain Thomson, representing the Royal Aero Club, and a lively debate ensued, which called forth some very delightful speeches.

Air Vice-Marshal Sir Sefton Brancker was all in favour of abolishing aviation of the Service type, but considered that Civil Aviation had its commendable points, as he said, it does provide a few people with a living wage!!!

Flying Officer Clarkson made a very humorous reply to Sir Sefton's speech, and proceeded to explain why "an F.O.'s lot is not an 'appy one." He considered it a bit hard therefore that we should complain that night bombing squadrons keep us awake at night: we should think of the poor pilots who have to get into a nasty cold aeroplane and take it up at nine or ten o'clock pip Emma, just when they would otherwise be going to bed.

Mrs. Elliott Lynn was entirely in agreement with Mr. Roe, she pointed out that flying is such a delightful sport that it grows on one, and after all, too much pleasure is bad for us.

Many other arguments for and against flying were submitted and to prevent further trouble, Mr. A. V. Roe decided to withdraw his motion.

Towards the end of the evening the Toast Master excelled himself by calling for silence for the Air Vice-Admiral Sir Sefton Brancker, who immediately announced that it had always given him great pleasure to be associated with the Senior Service; and subsequently the T.M. craved silence for the Rt. Hon. the Lord Louis Manhattan. One supposes that he could not switch his mind off the subject of cocktails.

Altogether a highly successful evening.

G-EBOH is still waiting for its new propeller, but G-EBOI has been putting in good work and in spite of fogs the week's flying time was practically 8 hours. Instruction flying, 5 hrs.; solo flying, 2 hrs. 45 mins.; passenger flying, 15 mins.

The following members had instruction:—Copper, 45 mins.; Lieut. Heine-mann, R.N., 40 mins.; Kerry, 35 mins.; Dickson, 25 mins.; Shepherd, 25 mins.; Southcliffe, 25 mins.; Moloney, 15 mins.; Perfect, 10 mins.; Langley, 10 mins.; Bound, 10 mins.; and Keeping, 50 mins. Keeping was successfully sent off solo, and shows promise of becoming as good a pilot as he is a footballer. The soloists were:—Rumble, 37 mins.; Fry, 35 mins.; Simmonds, 25 mins.; Perfect, 18 mins.; Lieut. Graham, R.N., 35 mins.; Keeping, 10 mins.; Bowen, 5 mins.

On Sunday, Mr. O. E. Simmonds passed the qualifying tests for his "A" licence.

The first annual dinner of the Hampshire Aeroplane Club was held at the South-Western Hotel, Southampton, on December 2, the President, the Rt. Hon. Lord Louis Mountbatten, K.C.V.O., R.N., presiding.

Among the large company present were: the Mayor and Mayoress (Alderman and Mrs. P. V. Bowyer), Lord Apsley, D.S.O., M.P., Colonel E. K. Perkins, C.B.E., M.P., and Mrs. Perkins, Mr. O. E. Simmonds, M.A. (Chairman of the Club), Mr. R. V. Perfect (Hon. Secretary), Mr. R. H. Bound (Hon. Publicity Secretary), Mr. A. V. Roe, O.B.E., the Rev. E. Bruce Cornford, M.A., the Sheriff of Southampton (Councillor Mrs. Foster Welch), the Deputy Mayor (Councillor J. E. Silverman) and Mrs. Silverman, Mr. R. J. Parrott, Squadron-Commander J. Bird, O.B.E., R.N., Captain F. J. Bailey, Colonel Crichton, Captain Wilson, Captain G. I. Thomson, D.F.C. (chief pilot instructor to the Club), Dr. Butler, Mr. A. N. Clifton, Mrs. Elliott Lynn, and many others.

"The King" was loyally honoured at the call of the chairman, after which a number of very interesting speeches were made, amongst others, by the Mayor, the President, Lord Apsley and Sir Sefton Brancker. Unfortunately, lack of space prevents a report of the speeches, but it may be noted that it was proposed to open a fund to provide for the good equipment of the clubhouse, and the President opened the list with a subscription of £50—several others following his lead with generous offers.

The Yorkshire Aeroplane Club

REPORT for the week ending December 3:—Flying took place on two days when 2 hrs. 30 mins. was flown in seven flights made up as follows:—

Solo: 1 hr. 50 mins.; dual, 15 mins.; test, 5 mins.; and a joy-ride of 20 mins. given by Mr. Carter.

Messrs. Lax, Mann, and Watson flew solo, while Mr. Mann also received 15 mins. advanced dual.

The official examiner, Mr. Loton, came over from Brough on Sunday in the hope of being able to pass out the Members ready to take their "A" licences, but our hopes were again damped by the dense fog which enveloped the Aerodrome and showed no signs of lifting by the time dusk fell, so the tests will have to be postponed until the following week-end, when we hope more favourable conditions will prevail.

The Committee is at present considering the purchase of a third machine for the use of solo members. Our choice rests between the Britsol "Brownie," Beardmore "Wee Bee," Parnall "Pixie," or the D.H. "53," the Air Ministry having six of the latter type for disposal by public auction.

The club has already been promised £200 towards the purchase of a third machine provided we are able to find the balance. Further contributions from anyone interested in the club will, therefore, be most gratefully received by the Secretary.

ROYAL AERONAUTICAL SOCIETY

(Official Notices.)

Lecture.—The last lecture of the first half of the Sixty-second Session, will be held on Thursday, December 16, at 6.30 p.m., at the Royal Society of Arts, John Street, Adelphi, W.C.2, when Wing-Commander C. Breese, A.F.C.,

of the Technical Training Section of the School of Technical Training (Apprentices), at Halton, will read a paper on "The Training of Aircraft Apprentices." Colonel the Master of Sempill, A.F.C., A.F.R.Ae.S., Chairman of the Society, will preside.

J. LAURENCE PRITCHARD, Hon. Sec.



AIRISMS

FROM THE

Four Winds.

The School Boys' Own Exhibition

In addition to a number of interesting diagrams and photographs illustrating the history of aviation, the Air Ministry is lending a complete aeroplane of modern type for the School Boys' Own Exhibition, which will be held at the Royal Horticultural Hall, Westminster, from January 1 to 7 next.

Cherbourg-Southampton Air Service

In order to save about one day in the transit of passengers and mails to this country from the Atlantic liners, negotiations are in progress between the British and French Governments for the institution of a regular seaplane service between Cherbourg and Southampton. Passengers and mails would be conveyed to the military air port at Querqueville, and travel thence by flying-boat to Southampton, arriving there some time ahead of the liner. A similar service would be run between Southampton and Cherbourg.

The "Moth's" Eastern Tour

CAPT. STACK and Mr. Leete, of the Lancashire Aero Club, who are flying to some destination in the East, made a thrilling flight on November 30, when they flew over Mount Vesuvius, thence by Mount Etna over 60 miles of sea to Halfar aerodrome, Malta. They are the first civilian pilots that have landed at Malta during a flight to the East.

The Schilovsky Turn Indicator

WE understand that the Schilovsky Turn Indicator, which was described and illustrated in *FLIGHT* for January 29, 1925, has just successfully passed all the Air Ministry Tests, and it is expected that a first order for an instrument will be given to the makers, Messrs. Munro, Ltd. We understand that the latest design of the instrument differs in several respects from the original instrument previously described in *FLIGHT*. Not only have the Air Ministry introduced several modifications, to meet the requirements of flying in fog and by night, but Messrs. Aircraft Patents, Ltd.—the Licensees of the inventor—have introduced improvements. For instance, the various pointers and scales have been made exceptionally readable under all conditions of flying—being at night, luminous. Lack of space will not allow of further details (these we hope to give later), and we only wish to add that this instrument is now officially called the "Schilovsky-Cooke Turn Indicator," and to offer congratulations on the successful results obtained to all concerned—the inventor, M. Schilovsky, the Technical Staff of the Air Ministry, Mr. G. H. Cooke, and Messrs. Munro, Ltd.

Air Mail Service in Colombia, South America

THE Postmaster-General announces that, by arrangement with the Air Company concerned (Scadta), the present system under which letters and other packets intended for onward transmission by the above-mentioned service can be posted under cover addressed to the Office of that Company in Colombia, and prepaid in Colombian Air Mail stamps, will cease as from December 6; and, beginning on that date, official facilities for such letters will be provided. Under the new system air postage must be prepaid in British postage stamps at the rate shown below, and the letter or packet must bear in the upper left-hand corner a British official blue "Air Mail" label, or be plainly marked in manuscript "Air Mail." Correspondence posted under the new arrangement cannot for the present be registered. The amount of the air postage payable (in addition to ordinary foreign postage at the rate applicable to the class of packet concerned) will be as follows:—On letters and postcards 1s. per $\frac{1}{2}$ oz. (or fraction thereof), on printed and commercial papers, samples, etc., 6d. per $\frac{1}{2}$ oz. (or fraction thereof). Correspondence which is not fully prepaid with ordinary and air postage will be excluded from Air Mail transmission. The Air Mail serves all parts of the interior of Colombia, and offers a saving of up to ten or more days in transmission of letters to such places as Bogotá, Medellín, Manizales, Bucaramanga and Cali. At most places delivery will be effected by the Air Company or its agents. The dates and latest time of posting for the Air Mail will in general be the same as for the ordinary mails for Colombia, South America, despatched via New York. There will, however, be no late fee posting by boat train at Waterloo or Euston Station in London.

A New Style Commercial Traveller

MR. J. C. PHILLIPP, who has done much flying on various types of aircraft during the past nine years, has started out on a new, and we think unique, venture—that of flying salesman for a vacuum cleaner. Carrying a sample with him, he is travelling over various parts of this country and Ireland by air, making an organised canvass in connection with the sale of this article.

Sir Alan Cobham Visits the White House

SIR ALAN COBHAM, accompanied by Lady Cobham, flew in the D.H. "Moth" from Philadelphia to Washington on December 3. They called at the White House, and were received by President Coolidge.

Another French Flight to Madagascar

ON November 28 the French Military pilot, Commandant Dagneaux, accompanied by Serg. Dufort, left Le Bourget on a Breguet XIXA.2 (600 h.p. Renault) *en route* for Madagascar. He was forced to descend at Lyons owing to fog, but eventually got as far as Marseilles on the following day. He arrived at Alicante on December 2, and proceeded to Oran on December 3, leaving here the following day for Colomb-Beechar.

Australian Survey of Papua

THE Australian Commonwealth proposes to make a complete geological survey of all areas in Papua and the territories of New Guinea under Australian Mandate likely to prove oil-bearing. No doubt aircraft will play a very important part in this work.

A New French Aerial Lighthouse

WHAT is claimed to be the most powerful lighthouse in the world has been constructed by the French Aeronautical Authorities on Mt. Valérien, just outside Paris. Intended to serve as a guide for aircraft, this light will throw a beam of 1,000,000,000 candle-power, visible 60 miles.

End of Australian Pacific Flight

GROUP-CAPT. R. WILLIAMS, Chief of Australian Air Staff, who was forced to abandon the survey flight of the South Pacific Islands, owing to a mishap to his engine, arrived back—in the temporarily-repaired D.H.50 seaplane—in Melbourne on December 7.

Royal Aero Club Monthly House Dinner

THE Monthly House Dinner fixed for the 8th inst. has been postponed until Wednesday, 15th inst., when the subject for discussion will be "Airships," opened by Mr. Griffith Brewer. Lord Thomson will occupy the Chair, and Admiral Murray Sueter, M.P., Lieut.-Col. J. T. C. Moore-Brabazon, M.P., Major Scott and Wing-Commander Fellowes have all promised to attend. Members wishing to attend are requested to notify the Secretary as early as possible as the accommodation is limited to 60.

Operations in Waziristan, 1925.

THE Air Ministry announces:—(1) The India General Service Medal, 1908, in silver, with Clasp "Waziristan, 1925" will, provided that the claims are approved by the Air Council, and subject to paragraphs 2 and 3, below, be granted to personnel of the Royal Air Force who took part in the operations in Waziristan between March 9, 1925, and May 1, 1925 (both dates inclusive), under the command of Wing-Commander (now Group-Captain) R. C. M. Pink, C.B.E., Royal Air Force, and who were located at Tank, Miramshah, Sorarogha, and Khirgi.

(2) Individuals already entitled to, or in possession of, the medal will receive in addition the clasp only.

(3) Individuals who previously qualified for the India General Service Medal with Clasp "Waziristan, 1921-24," (or for the clasp "Waziristan, 1921-24" only) and who also took part in the operations referred to in paragraph 1 above, will be given the option of receiving the clasp "Waziristan 1921-24" or the clasp "Waziristan 1925," but will not be entitled to receive both clasps to the medal.

(4) Officers no longer serving may obtain copies of the forms of application from the Secretary, Air Ministry, Adastral House, Kingsway, London, W.C.2, and airmen no longer serving from the Officer in Charge Records, Royal Air Force, Ruislip, Uxbridge, Middlesex. The forms, when completed, should be forwarded to the Secretary, Air Ministry.

AIR MINISTRY NOTICE TO AIRMEN

Revised Notes on the Licensing of Private Pilots (Class A Licences) and the Flight of Private Flying Machines

THE following notes, revised in accordance with the provisions of Air Navigations, 1926, A.N.D.6, are substituted for those published in Notice to Airmen No. 56 of 1925, which is hereby cancelled.

As it is possible that there may be some misconception regarding the regulations governing the issue and renewal of Private Pilots' Licences, *i.e.*, Licences for the operation of flying machines not carrying passengers or goods for hire or reward, the following notes are published for the information and guidance of all concerned:—

I.—Issue of Licence

Requirements.—(1) A person applying for a Private Pilot's Licence will be required to produce evidence of:—(a) Medical fitness; (b) Competency; (c) Recent flying experience.

Application.—(2) The applicant must—

(i) Obtain from the Air Ministry a form of application (C.A. Form 2A) and a medical report from (C.A. Form 61).

(ii) Undergo medical examination by a duly qualified medical practitioner, to whom he should hand C.A. Form 61 and who should forward it on completion direct to the Air Ministry.

(iii) Complete C.A. Form 2A and forward it to the Air Ministry, together with three unmounted photographs showing an image of the head not larger than $1\frac{1}{4} \times \frac{3}{4}$ ins. A fee of 10s. must accompany this form, unless the applicant comes under para. 4 (ii), in which case 5s. must be sent, together with a fee of £1 1s. for the practical flying test (*see* para. 3 (a)).

Practical Tests.—(3) If the medical report under para. 2 (ii) is considered satisfactory, and if the applicant is not exempted under para. 4, he will, in accordance with para. 75A of A.N.D.6, be required to prove his competency by—

(a) Carrying out certain practical flying tests, *viz.*—

(i) A test for altitude and gliding flight; (ii) Tests of skill.

Arrangements for these tests will be made by the Air Ministry and a fee of £1 1s. charged.

Technical Examination.—(b) Undergoing a technical examination in:—

(i) Knowledge of rules as to lights and signals, general rules for air traffic and special rules for air traffic on and in the vicinity of aerodromes.

(ii) Practical knowledge of international air legislation.

This examination will be conducted orally at the Air Ministry. A syllabus can be obtained on application.

Exemptions.—(4) (i) An applicant who holds a Royal Aero Club Certificate issued between February 1, 1920, and October 31, 1922, or who has qualified as a Royal Air Force pilot, is exempted from the practical flying tests under para. 3 (a).

(ii) An applicant who holds a Royal Aero Club Certificate issued after October 31, 1922, is exempted from both the practical tests and the technical examination referred to in para. 3 above.

Recent Flying Experience.—(5) The performance of not less than three hours' solo flying within the 12 months preceding the application is the qualification under para. 1 (c). The evidence normally required will be the production by the candidate of his Pilot's Log Book containing the record of this minimum amount of solo flying, or a certificate in a similar sense from an approved person or body (*e.g.*, a flying club).

Validity.—(6) Private Pilots' Licences are valid, subject to medical re-examination in case of serious ailment, for a period of one year from the date of issue.

II.—Renewal of Licence

Requirements.—(7) A person applying for the renewal of a private pilot's licence will be required to produce evidence of recent flying experience.

Application.—(8) The applicant must (i) Forward his licence and a fee of 5s. to the Air Ministry. (ii) Furnish evidence as required in para. 5 above of having flown solo for not less than three hours within the twelve months preceding the application.

Practical Tests.—(9) Failing the production of the evidence required under para. 8 (ii), the applicant will be required to carry out the practical tests laid down in para. 80 (b) of A.N.D.6: (a) Three figure of eight turns. (b) Three landings, finally stopping the aircraft on each occasion within a distance of 50 yards from a previously arranged point.

Arrangements for these tests will be made by the Air Ministry.

III.—Flight of Private British Flying Machines within Great Britain and Northern Ireland

General Conditions of Flying.—(10) A flying machine may not fly (except for the purpose of experiment or test and subject to certain other conditions, or in accordance with directions or special permission in writing given by the Secretary of State) unless—

(a) It has been registered and bears its nationality and registration marks and the name and address of the owner.

(b) It has been certified as airworthy and complies with the conditions specified in its airworthiness certificate.

(c) Its operating personnel possess the prescribed certificates of competency and licences.

(d) It carries the prescribed documents and journey log book, kept up to date in the prescribed form and manner.

Registration.—(11) (i) Application for registration must be made to the Air Ministry on C.A. Form 1 accompanied by a fee of £1 1s. A diagram showing how the nationality and registration markings should be painted on the flying machine is sent out by the Air Ministry with the Certificate of Registration if desired. These markings, together with name and residence of owner, must also be inscribed on a metal plate affixed to the fuselage.

(ii) In the event of change of ownership the Air Ministry must be notified and the registration lapses.

(iii) In the event of the flying machine being destroyed, or permanently withdrawn from use, the Air Ministry must be notified and the registration lapses.

Certificate of Airworthiness.—(12) (i) Application for a Certificate of Airworthiness must be made to the Air Ministry on C.A. Form 3 accompanied by a fee of £5 5s. in the case of a "subsequent aircraft," *i.e.*, a flying machine which conforms in all essential respects affecting its safety with a "type aircraft" in respect of which a Certificate of Airworthiness has been issued. Fees for "type aircraft" are higher and are based on the "tare" weight; details are set out in Schedule VI of the Air Navigation (Consolidation) Order, 1923.

(ii) Certificates of Airworthiness are normally valid for one year from date of issue, and are renewable annually after inspection of the flying machine by the Aeronautical Inspection Directorate. For each renewal a fee of £5 5s. is charged.

(iii) All flying machines must carry instruments and equipment as specified in Section V of A.N.D.6.

(iv) Overhauls and repairs of private flying machines must be certified by a licensed ground engineer qualified under the terms of his licence to carry out the overhaul or repair in question, or by the authorised representative of a firm or company approved by the Air Ministry for the purpose of giving such certificates. Daily certificates of safety are not required. Certificated flying machines may be inspected by authorised representatives of the Secretary of State, and the Secretary of State may cancel or suspend the certificate of airworthiness of any flying-machine deemed to be unsafe.

Prescribed Documents.—(13) The following documents must be carried in all private flying machines registered in Great Britain and Northern Ireland:—(i) Certificate of Registration. (ii) Certificate of Airworthiness (to be kept in pocket of journey log-book). (iii) Pilot's licence. (iv) Journey log book.

(Journey log-books are obtainable from the Air Ministry, price 4s. each; they are issued only in respect of individual flying machines, and the first page of each book is completed by the Air Ministry before issue.)

Aerodromes.—(14) Private flying machines may operate from unlicensed aerodromes, though they have no right of landing in any place as against the owner of the land or other persons interested therein.

General.—(15) (i) Before flying private flying-machines, pilots should study the provisions of the Air Navigation Orders and Directions (a list of which is contained in Section IV) regulating flight in this country, and in particular those relating to general safety, rules of the air, dropping of articles and prohibited areas.

(ii) Attention is also called to the Investigation of Accidents Regulations and to the requirements with regard to the notification of accidents.

IV.—Air Navigation Regulations

16. The full regulations governing the flying of British aircraft registered in Great Britain and Northern Ireland are to be found in the following publications, all of which are obtainable from H.M. Stationery Office, Kingsway,

London, W.C.2, or through any bookseller, at the prices shown:—(i) Air Navigation Act, 1920; price 2d. (ii) The Air Navigation (Consolidation) Order, 1923; price 1s. (iii) The Air Navigation (Amendment) Order, 1925; price 3d. (iv) The Air Navigation Directions, 1926 (A.N.D.6); price 6d. (v) The Air Navigation Directions, 1922 (A.N.D.4); price 1d. (vi) The Air Navigation Directions, 1923 (A.N.D.4A);

price 1d. (vii) The Air Navigation Directions, 1923 (A.N.D.4B); price 1d. (viii) The Air Navigation Directions, 1923 (A.N.D.5); price 1d. (ix) The Air Navigation (Investigation of Accidents) Regulations, 1922; price 2d. (x) The Air Navigation (Investigation of Accidents) (Jersey and Guernsey) Regulations, 1926; price 3d. (No. 80 of 1926)

IN PARLIAMENT

Royal Air Force and India

MR. KELLY, on November 29, asked the Under-Secretary of State for India the number of Indians employed in the Royal Air Force in India; and whether there is any limitation as regards the capacity in which they are employed.

Earl Winterton: Royal Air Force units in India are in the same position as units of the British Army in that country, *i.e.*, they are units of the Imperial Forces and not part of the Indian Army. These units comprise no enlisted Indian personnel but, as in the case of British Army units, Indians are engaged as civilians for various duties. The number of Indians at present so employed is about 1,000.

West Indies Air Service

SIR H. BRITAIN asked the Secretary of State for Air whether any efforts are being made at the present time to link up by seaplane service the islands of the West Indies?

Sir Samuel Hoare: An Inter-Departmental Committee was recently appointed to explore the opportunities which may exist for the operation of civil air transport in the West Indies, and their report is now being studied.

Sir H. Britain: Will the right hon. gentleman consider, as a start, forming a base at Georgetown, radiating in one way inland and on the other to Barbadoes and Trinidad?

Sir S. Hoare: That is one of the questions which is being considered. The main question is one of money, and the obligations will fall mainly on the West Indies services.

Sir H. Britain: These services will pay for themselves.

R.A.F. Fatal Accidents

COL. DAY, on December 1, asked the Secretary of State for Air the number of disasters resulting in loss of life to officers and men of the Royal Air Force

during the 12 months preceding the last convenient date, stating the number of aircraft involved that were of War-time design and the number that were of post-War design respectively?

Sir Samuel Hoare: During the 12 months ending November 22, 1926, there have been 54 fatal accidents in the Royal Air Force. Of these, 36 occurred on aircraft of types in service before the end of the War, and 18 on types brought into service after the War. The number of hours flown on machines of "War-time" design was, however, very much greater than that flown on machines of "post-War" design, and there is no ground for believing that the older types of machine still in use are more liable to accident than those of more modern design.

Accidents

MR. HAMMERSLEY asked what proportion of fatal accidents in the Air Force this year have been on machines of a type introduced before 1917?

Sir S. Hoare: Thirty-two per cent.

R.A.F. Recruits

MR. DAY asked the Secretary of State for Air the number of recruits enrolled into the Royal Air Force during each of the 12 months preceding the last convenient date?

Sir S. Hoare: The following table gives the information requested by the hon. and gallant Member:—

Men.—1925: November, 137; December, 60. 1926: January, 47; February, 10; March, 23; April, 108; May, 21; June, 21; July, 6; August, 3; October, 2. Total, 438.

Apprentices.—1926: January, 501; September, 508.

Apprentices are recruited by means of examinations which are held twice a year.

The Royal Air Force Memorial Fund

THE usual meeting of the Grants Sub-Committee of the Fund was held at Iddesleigh House, Caxton Street, London, S.W.1, on December 2. Lieut.-Commander H. E. Perrin was in the Chair, and the other Members of the Committee

present were:—Mrs. L. M. K. Pratt-Barlow, O.B.E., Mr. W. S. Field, Squadron-Leader Douglas Iron, O.B.E. The Committee considered in all 14 cases, and made grants to the amount of £76 4s. The next Meeting was fixed for December 16, at 2.30 p.m.



THE DORNIER SUPER-WAL: This Dornier all-metal flying-boat, which is fitted with two Rolls-Royce "Condor" engines of 650 h.p. each, recently carried out some remarkable flights over Lake Constance, on one occasion carrying 55 passengers at 125 m.p.h. Our pictures show (top) the machine in flight over Lake Constance and (below) 50 of the passengers who went up together.

AIRCRAFT AND IMPERIAL DEFENCE

Speeches at the Imperial Conference

THE texts of the speeches on the subject of Imperial Defence, made by Mr. Baldwin (On October 26) and the visiting Dominion Prime Ministers (On November 15), were published on December 2. We give below extracts from these speeches in so far as they concern the part played by aircraft.

Mr. Baldwin, in dealing with the subject of aircraft in Imperial Defence, referred to the danger to which this country, especially London, would be exposed in certain contingencies from air attack. He was, he said, glad to report that we were less anxious on this matter than we were in 1923. Nevertheless, as the countering or mitigation of such attacks was very difficult and required immense organization, in addition to the establishment and development of the Home Defence Air Force, we had been conducting a continuous investigation into the precautions of all kinds to be taken in the event of air raids, on which we had made considerable progress. We had also an Expert Committee inquiring into the question of anti-aircraft research. In addition, we had worked out a scheme of insurance against aircraft and bombardment risks in the light of war experience.

Mr. Mackenzie King, Prime Minister of Canada, who stated during the course of his speech that the Canadian Government had, in 1922, decided to organise one department to contain the three Services and deal with all questions of Defence—said, in reference to aircraft, that before and during the Great War Canada had no Air Force of her own, although 10,000 Canadians served in the Aerial Forces of Great Britain in the war against Germany. Soon after the Armistice, in 1919, the organisation of a Canadian Air Force was commenced, and had proceeded gradually, and on April 1, 1923, the Royal Canadian Air Force was established on a regular military basis. The organization and training of this Force had followed closely that of the Royal Air Force, and very substantial progress had been made. Two training centres and six stations (three temporary, during the summer months) had been established in various parts of the country, so as to carry out the several duties of the Royal Canadian Air Force.

The Royal Canadian Air Force had made commendable advances in the civil side of its work. As he mentioned at a previous session of the Conference, immense areas were being surveyed annually, and millions of acres of valuable forest land protected. The work on the civil side was of such a nature that it provided practical training for the Air Force personnel. Civil aviation had a direct relation to the creation of a Military Air Force, and served to create a reserve thereto. By the Air Force Regulations an individual who obtained a pilot's certificate automatically became a Reservist.

The Prime Minister of the Commonwealth of Australia, Mr. Bruce, stated that the ordinary expenditure for the maintenance of Australia's local Defence Force—Navy, Army, and Air—now amounted to approximately £5,000,000 per annum, in addition to £5,000,000, spread over a period of five years, for development.

As regards Air Force development, the additional money which came out of the £1,000,000 special expenditure was for building and works generally, to provide additional personnel and equipment, and the training of the additional personnel for the establishment of new squadrons to be formed next year. Civil aviation, which linked with military aviation through the necessity of providing air bases, landing grounds, and other requirements throughout the whole of the Continent, was being dealt with by air route subsidies. In addition, they were doing a great deal of work in connection with the preparation of landing grounds and other requirements, and also the establishment of aeroplane clubs.

In addition to the £5,000,000 for development, special appropriations had been made since July 1, 1924, included in which, amongst other items, was a sum for the survey of the Great Barrier Reef, and £250,000 for the purchase of aircraft equipment, provision of Air Force accommodation, etc.

Mr. Bruce also pointed out that close co-operation existed between the Home and Australian services, Australian liaison officers being attached to the Admiralty, War Office and Air Ministry.

The Royal Australian Air Force during the current year would attain a strength of 1,200 officers and men. It was organised on precisely similar lines to the Royal Air Force, and its development would eventually provide for the necessary co-operation squadrons for the Fleet and for the Army, fighter, bombing, and reconnaissance squadrons,

besides the ordinary training schools and experimental institutions.

The air training policy followed that of the Royal Air Force. Pilots for the permanent, short service, and Citizen Force were given the full flying course at the Flying School. Co-operation exercises were carried out with naval units as and when required. A flight of flying-boats was at present engaged in the naval hydrographic survey of the Great Barrier Reef. Army co-operation was provided at the annual training camps of artillery and infantry units, and from time to time when opportunity arose. In addition to the ordinary peace training, the Air Force carried out a considerable amount of survey and photographic work for the Navy, Army, Government and Municipal Departments. No attempt had been made so far to operate air routes for civil purposes with Service units. As arranged at the last Imperial Conference, an exchange of officers was instituted and was now in operation. Officers of the Australian Air Force were sent to England to the Air Staff College and other establishments. This year there were six officers under instruction in this country.

The Commonwealth Government had approved of the formation of aeroplane clubs, with the object of building up a reserve of pilots and airmen and to encourage aviation in Australia generally. Several clubs were in operation, and others were under consideration.

Mr. Bruce also referred to the survey flight to the South Pacific Islands. Orders were being placed for new aircraft and engines, and the whole of their service air units would be re-equipped with the most modern types in the course of the next three years. Their Air Experimental Section had undertaken the manufacture of aircraft on a limited scale, and several firms had engaged in re-conditioning aircraft, engines, and minor spare parts. Two civil aircraft firms were engaged in the local assembly of aircraft from parts which had been imported. There was every indication that local firms had gained sufficient experience to be in a position to commence manufacture of aircraft as soon as there were sufficient orders to justify the outlay required to undertake the work. Landing grounds were being established on strategical air routes, in addition to those prepared for civil aviation purposes. There were 134 aerodromes and landing grounds already acquired and maintained.

Mr. Coates, Prime Minister of New Zealand, who agreed that the importance of the air arm was definite, said, concerning air policy, that New Zealand was anxious to continue her development on lines which were co-operative with Great Britain and possibly with Australia, but any commercial development which they might be able to effect must of necessity be slow, and with due regard to what took place in other parts of the Empire, as they were at the end of a long line and over 1,000 miles of stormy weather and sea separated their centres of population from Australian cities.

Regarding development of the fighting Air Service, he felt that their geographical position to a great extent governed their policy, though co-operation by the Air arm with the Military and Naval Forces of the Dominion, both for local defences or overseas expeditionary work, was always kept in view.

Mr. Havenga, on behalf of the Union of South Africa, stated it was their air and land forces which, from the South African standpoint, were most important to them to-day, and, in case of a war in which the Union was participating, it was with these that they should be able to render most effective assistance. Their policy was to maintain an Air Force in South Africa primarily for internal security, ready to act instantly, as a striking force and to hold and restrict any serious disturbance of the peace during the period that the Citizen Forces of the country were being mobilized and brought into action. It was concentrated at Pretoria, and its mobility was ensured by aerodromes and landing grounds throughout South Africa. One squadron could operate at any point in the Union within one day. It was organized and trained on the same lines as the Royal Air Force, thus ensuring easy co-operation with the rest of the Air Forces of the Empire.

In connection with the demonstration flights from Cairo to Cape Town, to which reference was made in the Committee of Imperial Air Communications, their advisers had worked out with the Air Ministry most of the details of the flights and

had arranged that the Royal Air Force machines which would fly from Cairo next year, would combine with their Air Force in the programme of active citizen training at their annual camps at Potchefstroom and Cape Town in the beginning of April next. This small measure of co-operation represented a beginning of the closer air co-operation to which they were looking forward. The South African Government were extremely grateful for the invaluable assistance received from the Royal Air Force, who had unstintingly placed the results of their researches and the labours of their training and organization staffs at their disposal.

They realized and accepted the views held that, where expenditure did not matter, the ideal method of coastal defence was a combination of aircraft and fixed defences. It did not appear possible, without weakening either branch to the point of ineffectiveness, to bring about this ideal combination in South Africa and at the same time keep the expenditure within their resources. They felt that the present strength of their Air Force was a very bare insurance cover. The employment, therefore, of aircraft on coastal defence would enormously enhance the strength of their Air Force, as such coastal aircraft could be utilized equally

well for military operations inland in any purely local emergency.

He wished, therefore, to take this opportunity of putting forward a suggestion in the following concrete form:—That the Committee of Imperial Defence may be asked to review the policy of South African Coastal Defence, and, on the assumption that in the near future it would be necessary to re-arm some of the South African coastal defences and perhaps to increase the defences at certain ports, and, in view of the probable nature and scale of attack against South Africa, to consider whether aircraft could not be more efficiently and economically employed for that purpose. Further, to take into special consideration the enormously enhanced internal security which this increase in the strength of the South African Air Force would give, and the additional advantages of (1) coastal reconnaissance, including convoy work and anti-submarine patrols; (2) air co-operation with the Africa Squadron, Royal Navy, in gunnery and strategic exercises, and increased co-operation with Army coastal units; and (3) possible employment on coastal and fishery survey. [This suggestion was accepted by the Prime Minister of Great Britain, on behalf of the Committee of Imperial Defence.]

THE ROYAL AIR FORCE

London Gazette, November 30, 1926.

General Duties Branch

Flying Officer R. S. Blucke is granted a permanent commission in rank stated (Nov. 1). The following Pilot Officers are promoted to rank of Flying Officer:—P. V. Williams, L. T. Pankhurst (Oct. 14); L. A. Walsh (Oct. 17); T. H. Perry-Keene, H. R. Bardon, I. G. E. Dale (Oct. 31). Pilot Officer on probation M. A. Smith is confirmed in rank (Oct. 20); Flight-Lt. R. Pyne, D.F.C., is seconded for service as Aide-de-Camp to the Governor of the United Provinces (Nov. 1); Flight-Lt. E. W. Simpson is granted permission to retain rank of Squadron Leader on transfer to Reserve (Oct. 24); Flying Officer G. J. Stroud, M.B.E., is placed on retired list at his own request and is granted permission to retain the rank of Flight-Lt. (Dec. 1).

The following are transferred to the Reserve:—CLASS A.: FLYING OFFICERS.—F. S. Henderson, G. Terrell (Nov. 27); C. A. Goatcher (Nov. 28).

CLASS C.: FLIGHT Lts.—H. L. Nunn, D.S.C., D.F.C., A. J. Nightingale (Nov. 28).

Flying Officer A. R. Braybrooke (Lt. K. Shrops. L.I.) relinquishes his temporary commission on resigning his commission in the Army (Nov. 27).

Stores Branch

Flying Officer R. A. Dolton resigns his short service commission (Dec. 1).

Medical Branch

Flight-Lt. G. R. Hall, M.D., relinquishes his temporary commission on ceasing to be employed (Oct. 8).

Reserve of Air Force Officers

L. S. Ash is granted a commission in Class A. General Duties Branch, as a Pilot Officer on probation (Nov. 30); Pilot Officer on probation A. F. Waghorn is confirmed in rank (Nov. 30). The following relinquish their commissions on completion of service:—Flight-Lt. A. Roberts (Oct. 24); Flying Officer C. St. C. Parsons (Nov. 20).

Medical Branch

W. G. Weston, M.B., is granted an honorary commission as a Flight Lt. (Nov. 30).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:

Accountant Branch

Squadron Leader: E. N. E. Waldron to R.A.F. Depot, Uxbridge, on transfer to Home Estab., 4.11.26.

Flight-Lieutenants: O. K. Griffin to Station H.Q., Duxford, 25.11.26. I. L. Wincer to R.A.F. Depot, Uxbridge, on transfer to Home Estab., 4.11.26.

Flying Officers: C. B. Rawlins to R.A.F. Depot, Uxbridge, 23.11.26. J. L. Armstrong to R.A.F. Depot, Uxbridge, on transfer to Home Estab., 4.11.26. F. R. Barton to R.A.F. Depot, Uxbridge, on transfer to Home Estab., 25.10.26.

Flying Officer F. Rigby, to No. 99 Sqdn., Bircham Newton, 9.12.26.

Medical Branch

Group Captain H. V. Wells, C.B.E., to R.A.F. Depot, Uxbridge, pending posting on transfer to Home Estab., 4.11.26.

Squadron Leaders: E. W. Craig, M.C., M.B., to H.Q., Mediterranean, 16.11.26. J. Kyle to Air Ministry (Directorate of Med. Services), 16.11.26.

Squadron Leader E. A. Lumley, M.C., M.B., to R.A.F. Depot, Uxbridge, on transfer to Home Estab., 17.10.26.

Flight-Lieutenants: (Hon. Sqdn.-Ldr.) W. R. Reith, M.D., A.M., to R.A.F. Depot, Uxbridge, 15.11.26. E. C. K. H. Foreman to Station H.Q., Bircham Newton, 22.11.26. J. D. Leahy, M.C., M.B., B.A., and F. W. G. Smith, M.B., B.A., to R.A.F. Depot, Uxbridge, on transfer to Home Estab., 17.10.26. L. P. McCullagh, M.B., to R.A.F. Depot, Uxbridge (Non-effective Pool), on transfer to Home Estab., 17.10.26.

Flight-Lieutenant (Dental) J. R. Williams to H.Q., Halton, on appointment to a temp. commn., instead of to H.Q., Cranwell, as previously notified, 2.11.26.

Flying Officers: H. C. Patterson to R.A.F. Depot, Uxbridge (Non-effective Pool), on transfer to Home Estab., 17.10.26. J. O. Priestley, D.M.R.E., to R.A.F. Hospital, Cranwell, 24.11.26.

Squadron Leader R. W. Ryan, M.B., to H.Q., Egypt, 15.11.26.

Flight Lieutenants: T. Sheehan, to R.A.F. Training Base, Leuchars, 29.11.26. A. E. Jenkins, to Station H.Q., Bircham Newton, 29.11.26. E. C. K. H. Foreman, to R.A.F. Station, Tangmere, 3.12.26.

Flying Officers: R. A. W. Kerr, M.B. and E. Thompson, to Research Lab. and Med. Officers' Sch. of Instruction, for short course, on appointment to Short Service Commissions, 22.11.26. G. S. Strachan, M.B., to R.A.F. Station, Duxford, 1.12.26.

General Duties Branch

Wing Commander: W. C. Hicks, A.F.C., to R.A.F. Depot, Uxbridge, Supernumerary, pending posting on transfer to Home Estab., 25.10.26.

ROYAL AIR FORCE, MARTLESHAM "ANNUAL"

For the sixth year in succession, at the invitation of Wing Commander H. Blackburn, M.C., A.F.C., and the officers, Royal Air Force, Martlesham Heath, a number of the constructors and other friends, participated on December 3, in a very enjoyable evening in the officers' mess, following generous administration to the inner man.

Squadron Leader: B. F. Moore, to No. 5 Flying Training Sch., Sealand, 7.12.26. E. B. Beauman, to R.A.F. Base, Malta, 23.11.26. C. N. Lowe, M.C., D.F.C., to No. 6 Armoured Car Co., Iraq, 1.11.26.

Flight Lieutenant: A. F. James, to No. 5 Flying Training Sch., Sealand, 4.12.26. C. J. S. Dearlove, to No. 30 Sqdn., Iraq, 1.11.26. T. S. Horry, D.F.C., to No. 70 Sqdn., Iraq, 22.10.26. M. M. Freehill, D.F.C., to No. 55 Sqdn., Iraq, 1.11.26. G. Archer, to No. 503 Sqdn., Waddington, 23.11.26. T. Henderson, M.C., A.F.C., to No. 6 Armoured Car Co., Iraq, 28.10.26. R. E. G. Fulljames, M.C. and J. A. G. Haslam, M.C., D.F.C., to R.A.F. Depot, Uxbridge, on transfer to Home Estab., 25.10.26.

Flying Officers: A. E. Rogenhagen, to No. 56 Sqdn., Biggin Hill, 7.12.26. F. E. R. Dixon, M.C., to No. 3 Stores Depot, Milton, 3.12.26. E. R. C. Hobson, D.F.C., to No. 216 Sqdn., Egypt, 4.11.26. J. R. Brown, D.F.C., to No. 6 Sqdn., Iraq, 17.9.26. D. A. Boyle, to No. 6 Sqdn., Iraq, 1.11.26. L. S. Birt, to No. 84 Sqdn., Iraq, 1.11.26. A. T. S. Studdert, to No. 30 Sqdn., Iraq, 1.11.26. S. F. Coleman, to R.A.F. Depot, Uxbridge, on transfer to Home Estab., 25.10.26. C. J. A. Delany, to R.A.F. Depot, Uxbridge, on transfer to Home Estab., 25.10.26. C. H. A. Farnan, to Central Flying Sch., Wittering, 15.12.26.

Pilot Officer P. V. Williams to No. 503, Sqdn., Waddington, 23.11.26.

Stores Branch

Squadron Leaders: F. Grave, M.B.E., to H.Q., Cranwell, 7.12.26. J. S. Goggin, to H.Q., Inland Area, Stantmore, on transfer to Home Estab., 6.12.26.

Flight Lieutenant: T. S. James, to H.Q., Cranwell, 27.11.26. C. M. Bevan, to H.Q., India, 6.11.26. C. H. Pownall, to Aircraft Depot, India, 6.11.26. A. G. Knight, M.B.E., to R.A.F. Depot, Uxbridge, on transfer to Home Estab., 25.10.26.

Flying Officers: E. A. Burridge, to Sch. of Balloon Training, Larkhill, 23.11.26. F. W. Todd and C. W. Rugg, to R.A.F. Depot, Uxbridge, on transfer to Home Estab., 25.10.26.

NAVAL APPOINTMENTS

The following appointments have been made by the Admiralty:—

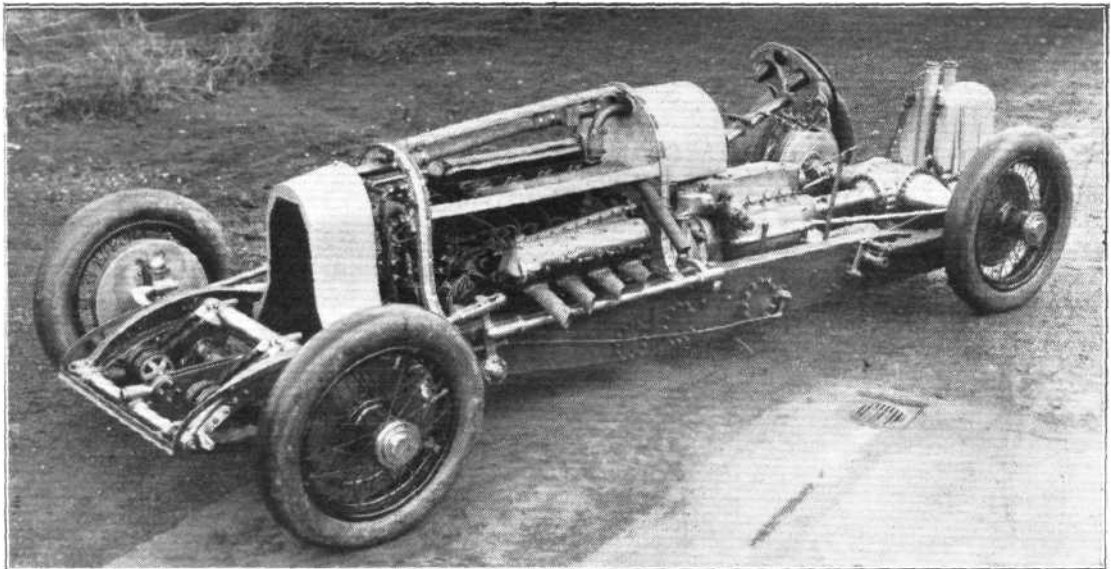
Lieut.-Commr. (Flying Officer, R.A.F.) R. H. Portal, to *Furious* and for full flying duties in 462 flight, 22.10.26.

Lieutenant (Flying Officer, R.A.F.)—A. G. Elliott, to *Eagle*, and for full flying duties in 460 flight, in command, 15.10.26.

Lieuts. (Flying Officers, R.A.F.)—H. R. M. Nicholl, C. R. V. Pugh and A. N. Waring, to *Vindictive*, and for No. 444 Flight, 19.11.26.

The popularity and hospitality of the Martlesham unit are so great that the accommodation and efforts of the *cuisine* for the hundred (more or less) of those present was tested to the utmost, but with most satisfactory results. An artistic menu, specially designed at the Station, was a feature, and "signing" thereon under "Who's Who" was a pastime which kept the guests and hosts busy after the King had been duly honoured.

An aero engine in a motor car: from this three-quarter view of the chassis of the Napier ("Lion")-Campbell racing car a general idea of the lay-out can be obtained.



SOCIETY OF MODEL AERONAUTICAL ENGINEERS (S.M.A.E.)

A MEETING took place at Headquarters (Central Y.M.C.A. Tottenham Court Road, W.) on December 3, at which Mr. C. A. Rippon read a paper on Farman type models, a subject in which he has specialised for many years now. The paper was full of interest, and was well illustrated by diagrams and photographs—a recent model with Bowden transmission gear also being exhibited. The full text will be published in the S.M.A.E. Journal.

On December 17 (7.30 p.m.) at Headquarters, a further meeting will take place, the following items being down for this date.

- (1) "Speed Models," by R. N. Bullock.
- (2) Sale of anything appertaining to aero model work, the proceeds to go to the club's funds.

It is hoped that all members will make an effort to be present on this occasion, as the paper on "Speed" should prove of especial interest. Non-members are also cordially invited, as the material and accessories which will be sold, following the paper, are likely to be of considerable use to all those interested in model aviation.

The Schoolboys' Exhibition, at which the Society will be represented, is to be held at the Royal Horticultural Hall (Vincent Square, S.W.) from January 1 to January 7, inclusive. Will members kindly note that models must be at the Hall on Friday evening, December 31, when our stand will be arranged.

B. K. JOHNSON, *Hon. Secretary.*

City of London Bombing Squadron

CAPT. GUEST, M.P. (who was Secretary of State for Air in 1921-22) has been appointed Squadron-Leader of No. 600 (City of London, Bombing) Squadron, Auxiliary Air Force. This squadron, which has its headquarters at Finsbury Barracks, together with No. 601 (County of London, Bombing) Squadron, will have the flying quarters transferred from Northolt, Uxbridge, to Hendon.

R.A.F. Examinations

THE Civil Service Commissioners announce that open competitive examinations for the entry of (1) aircraft apprentices and (2) apprentice clerks into the Royal Air Force will be held in Belfast, Birmingham, Cardiff, Chatham, Edinburgh, London, Plymouth, and Portsmouth on April 22, 1927. The limits of age are:—Aircraft apprentices, 15-17 on July 1, 1927; apprentice clerks, 15½-17, July 1, 1927. Forms of application, etc., will be sent in response to requests received by letter addressed to the Secretary, Civil Service Commission, Burlington Gardens, London, W.1.

Governor-General of Australia's Flight

On December 2 Lord Stonehaven, Governor-General of Australia, flew from Melbourne to Broken Hill in nine hours.

Swedish Air Collision

Two Swedish aeroplanes came into collision at the military aerodrome at Malmslätt on December 1 when carrying out manœuvres at an altitude of about 1,500 ft. The pilot of one of the machines was killed.

PUBLICATIONS RECEIVED

Conquering the Air. By Archibald Williams. Thomas Nelson and Sons, Ltd., Edinburgh, and Paternoster Row, London, E.C. Price 6s.

Commercial Air Transport. By Lieut.-Col. Ivo Edwards, C.M.G., and F. Tymms, M.C. Sir Isaac Pitman and Sons, Ltd., 39-41, Parker Street, London, W.C.2. Price 7s. 6d. net.

The Anodic Oxidation of Aluminium and its Alloys as a Protection Against Corrosion. Department of Scientific and Industrial Research. H.M. Stationery Office, Kingsway, London, W.C.2. Price 1s. 3d. net.

Aeronautical Research Committee Reports and Memoranda: No. 1028 (M.43).—Report on Study of Mechanical Properties of Silicon-Aluminium Alloys. Parts I and II. By J. D. Grogan. June, 1926. Price 1s. net. No. 1042 (A.4).—An Investigation on Wing Flutter. By R. A. Frazer. February, 1926. Price 1s. net. H.M. Stationery Office, Kingsway, London, W.C.2.

Transactions of the Institution of Engineers and Shipbuilders in Scotland. Vol. LXIX. Sixty-Ninth Session, 1925-26. The Institution of Engineers and Shipbuilders in Scotland, 39, Elmbank Crescent, Glasgow.

AERONAUTICAL PATENT SPECIFICATIONS

(Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

APPLIED FOR IN 1926

Published December 9, 1926

- 2,820. A. WEINGARTEN. Method of manufacture of framework supports for aeroplane wings. (249,821.)
21,728. D. NAPIER AND SON, LTD., and R. HUTCHINSON. Cylinders for i.c. engines. (261,318.)

FLIGHT

The Aircraft Engineer and Airships

36, GREAT QUEEN STREET, KINGSWAY, W.C. 2
Telegraphic address: Truditur, Westcent, London.
Telephone: Gerrard 1828.

SUBSCRIPTION RATES

"FLIGHT" will be forwarded, post free, at the following rates:—

UNITED KINGDOM		ABROAD*	
	s. d.		s. d.
3 Months, Post Free..	7 7	3 Months, Post Free ..	8 3
6 " " "	15 2	6 " " "	16 6
12 " " "	30 4	12 " " "	33 0

* Foreign subscriptions must be remitted in British currency.

Cheques and Post Office Orders should be made payable to the Proprietors of "FLIGHT," 36, Great Queen Street, Kingsway, W.C.2, and crossed Westminster Bank.

Should any difficulty be experienced in procuring "FLIGHT" from local newsvendors, intending readers can obtain each issue direct from the Publishing Office, by forwarding remittance as above.